THE IMPACT OF COMORBID ANXIETY ON COLLEGE STUDENT RESPONSE TO AN ADHD COACHING TREATMENT

by

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Attention-deficit/hyperactivity disorder (ADHD) creates profound impairments. Even when K-12 school-based interventions are successful and students with ADHD matriculate to college, there is a high likelihood of college dropout, failing grades, substance use, dangerous driving, and risky sexual behavior. Unfortunately, there are few proven mental health treatments for college students with ADHD, and little is known about what works for whom. The present study examined the acceptability and efficacy of ADHD coaching for college students and examined the moderating impact of anxiety on psychoeducational outcomes. Fifty-nine students were randomly assigned to ADHD coaching (n = 30) or a control condition (n = 29). Consistent with previous research, students were significantly more satisfied with ADHD coaching and rated the intervention as significantly more acceptable than students in the control condition. The main effect of ADHD coaching was inconclusive, but a small positive effect on grade point average (GPA) was noted. Results from simple moderation analyses were similarly inconclusive, but trends tentatively suggest that high levels of anxiety may be a risk factor for self-reported psychoeducational outcomes but also may confer treatment benefit for academic outcomes. Recruiting large samples of college students representing a wide range of trait anxiety appears necessary to examine the impact of comorbid anxiety on psychoeducational outcomes.

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CHAPTER I: INTRODUCTION AND LITERATURE REVIEW

Students with attention-deficit/hyperactivity disorder (ADHD) face challenges throughout their academic careers. In their elementary years, many students with ADHD struggle with reading, math, and interpersonal interactions (DuPaul, Morgan, Farkas, Hillemeier, & Maczuga, 2016). Secondary school students with ADHD receive more special education services, have a higher risk of grade retention, receive more failing grades, and are more likely to drop out of school relative to typically developing peers (Barkley, Anastopoulos, Guevremont, & Fletcher, 1991; Kent et al., 2011). Both children and adolescents with ADHD perform significantly worse on academic achievement measures than their peers (Frazier, Youngstrom, Glutting, & Watkins, 2007). It is estimated that between 2 to 8% of college students have an ADHD diagnosis (DuPaul, Weyandt, O'Dell, & Varejao, 2009). Although students with ADHD who pursue postsecondary education may represent an unusually high-functioning subgroup of individuals with ADHD, college students with this disorder are still at-risk for a variety of poor outcomes including lower graduation rates (Wolf, 2001) and grade point averages (GPA) (e.g., Gormley, DuPaul, Weyandt, & Anastopoulos, 2016) relative to typically developing peers.

The college experience poses several challenges for students with ADHD. For the majority of young adults, the transition to college is their first time living independently, which results in less supervision from adults (Blase et al., 2009). As college students are adjusting to their increased autonomy, the academic demands they face are more rigorous than ever before, and there is a reduction in access to individualized resources and assistance. Executive functioning skills such as planning, goal setting, organization, time management, and delaying gratification are integral in facilitating academic success in postsecondary settings. The brain structures involved in these higher-order cognitive processes are still developing during young

adulthood, but executive functioning skills among young adults with ADHD lag behind those of typically developing young adults (Fleming & McMahon, 2012; Weyandt, Oster, Gudmundsdottir, DuPaul, & Anastopoulos, 2017). Overall, the loss of structure and parental supervision, reduction in the availability of individualized assistance and resources, increased availability of immediate, short-term rewards, and demanding academic coursework—aspects inherent in the college context—coupled with underdeveloped executive functioning skills makes it especially difficult for students with ADHD to navigate the college experience successfully. It is not surprising, therefore, that college students with ADHD evidence impairments in several areas including their academic achievement (Blase et al., 2009; Frazier et al., 2007; Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999; Gormley et al., 2016; Norwalk, Norvilitis, & Maclean, 2009; Weyandt et al., 2013), emotional expression (Weyandt et al., 2013), occupational functioning (Shifrin, Proctor, & Prevatt, 2010), social interactions (Canu & Carlson, 2003; Shaw-Zirt, Popali-Lehane, Chaplin, & Bergman, 2005), and driving performance (Barkley, Murphy, DuPaul, & Bush, 2002), as well as higher rates of substance use (Rooney, Chronis-Tuscano, & Yoon, 2012) and risky sexual behavior (Huggins, Rooney, & Chronis-Tuscano, 2015) compared to their peers. They may also be at risk for experiencing comorbid psychological disorders, including anxiety and depression (e.g., Anastopoulos et al., 2018).

Although it is clear that college students with ADHD are at-risk for experiencing a variety of negative outcomes, treatment research is limited (Fleming & McMahon, 2012). Coaching is one form of psychosocial treatment for college students with ADHD that shows promise, but there has been inadequate focus on comorbid conditions and how those comorbidities may impact students' response to coaching treatments. The purpose of this study,

therefore, was to conduct a randomized controlled trial investigating the impact of comorbid anxiety on students' response to a psychosocial coaching treatment.

ADHD Symptomology

ADHD is a neurodevelopmental disorder marked by atypical, chronic levels of inattention and/or hyperactivity and impulsivity that cause significant functional impairments in daily living (American Psychiatric Association, 2013). Research shows that ADHD often persists into adulthood, particularly for inattentive symptoms (Resnick, 2005). In adult populations, inattention tends to manifest as disorganization, forgetfulness, boredom, chronic lateness, frequently losing personal belongings, difficulty with decision making and managing daily schedules, and distractibility (Prevatt & Levrini, 2015). Hyperactivity/impulsivity often presents as excessive talkativeness and/or fidgeting, being constantly on the go, poor driving performance, impatience, engaging in sensation-seeking behavior, impulsively switching jobs or relationships, and impetuous spending. Symptoms of inattention appear to be most problematic for college students with ADHD, leading to impairments in academic adjustment, study skills, and career efficacy (Norwalk et al., 2009). Additionally, inattention appears to be predictive of academic status, with more severe inattention predicting a greater likelihood of being on academic probation (Frazier et al., 2007).

Academic Impairments Related to ADHD

Theoretically, college students with ADHD may be an unusually high-functioning subgroup relative to individuals diagnosed with ADHD who do not attend college. It is likely that college students with ADHD possess resiliency factors such as effective compensatory strategies and high cognitive ability (DuPaul et al., 2009); however, college students with this disorder still experience a wide variety of academic impairments when compared to typically

developing peers. For instance, college students with ADHD have significantly lower GPAs compared to students without ADHD (Blase et al., 2009; Frazier et al., 2007; Gormley et al., 2016; Heiligenstein et al., 1999; Norwalk et al., 2009; Weyandt et al., 2013). College students with ADHD are also less likely to graduate (Wolf, 2001), perform significantly worse on weekly class assignments (Weyandt et al., 2013), are more likely to be on academic probation (Frazier et al., 2007), and drop out of classes more often (Turnock, Rosen, & Kaminski, 1998) relative to other college students. A significant, moderate effect of ADHD on academic achievement (d = 0.71) was found in a meta-analysis, indicating that individuals with ADHD of all ages perform well below individuals without ADHD on measures of academic achievement (Frazier et al., 2007).

In addition to broad indicators of academic impairment, researchers have also examined specific deficits in learning and study strategies among college students with ADHD. Several researchers have found that college students with this disorder struggle with the skills that facilitate academic success including organization, time management, concentration, motivation, note-taking, information processing, and study and test taking strategies (Advokat, Lane, & Luo, 2011; Norwalk et al., 2009; Reaser, Prevatt, Petscher, & Proctor, 2007; Simon-Dack, Rodriguez, & Marcum, 2016; Turnock et al., 1998; Weyandt et al., 2013; Weyandt et al., 2017). Additionally, college students with ADHD appear to experience a significant deficit in their time estimation abilities, which may underlie their difficulties with time management (Prevatt, Proctor, Baker, Garrett, & Yelland, 2011). College students with higher levels of ADHD symptomology are more likely to procrastinate relative to college students with lower levels of ADHD symptomology (Turnock et al., 1998), and college students with ADHD are more likely to use performance-focused studying approaches than intrinsically motivated, mastery-focused

approaches when compared to typically developing college students (Simon-Dack et al., 2016). College students with ADHD also appear less likely to participate in collaborative studying relative to typically developing peers, which may result in missed opportunities to learn effective study strategies (Simon-Dack et al., 2016).

Although most researchers have found impairments in learning and study skills among college students with ADHD, others have not. For example, when college students with and without ADHD participated in a simulation of a high-stakes reading exam, both groups of students self-reported using similar reading comprehension strategies and time management skills (e.g., amount of time spent on each passage) and had similar levels of reading speed, vocabulary, word recognition, and comprehension on the exam (Lewandowski, Gathje, Lovett, & Gordon, 2013). Although performance on the reading exam was similar between the college students with and without ADHD, college students with ADHD self-reported significantly higher perceived difficulty of the task and higher test anxiety compared to the students without ADHD. The authors speculated that college students with ADHD may experience elevated test anxiety due to low self-efficacy from previous negative test performance. Taken together, these findings seem to suggest that college students with ADHD experience higher rates of anxiety than typical peers, but the degree to which this anxiety impacts functional impairment is unclear.

ADHD and Anxiety

Prevalence. Anxiety is characterized by worried thoughts, tension, and physiological changes (American Psychiatric Association, 2013). Anxiety is generally thought to be the product of stable and potentially permanent traits, with some individuals having a higher predisposition to anxiety than others, and immediate reactions to anxiety-provoking situations that vary in relation to the stimulus. The former is referred to as *trait anxiety* and the latter *state*

anxiety (Endler & Kocovski, 2001). Anxiety is a potentially common comorbidity among college students with ADHD (Prevatt et al., 2015) as anxiety is prevalent among both children (Schatz & Rostain, 2006) and adults with ADHD (Barkley, Murphy, & Fischer, 2008). It is estimated that 15% to 35% of children with ADHD experience comorbid anxiety (Schatz & Rostain, 2006). In samples of adults with ADHD, prevalence rates of comorbid anxiety as high as 47% have been reported (Kessler et al., 2006). Although anxiety appears to be a common comorbidity among both children and adults with ADHD, the prevalence and implications of comorbid anxiety among college students specifically have not been well studied (Nelson & Gregg, 2012). It is unclear, therefore, to what extent college students with ADHD experience anxiety and whether comorbid anxiety has any implications for college students' functioning (Prevatt et al., 2015; Prevatt & Yelland, 2015).

College students with ADHD may be more likely to meet diagnostic criteria for comorbid anxiety disorders compared to college students without ADHD. For instance, first year college students with ADHD were significantly more likely to meet criteria for a non-ADHD (comorbid) disorder on a structured clinical interview relative to students without ADHD, with 55% of students with ADHD meeting criteria for a comorbid disorder compared to 11.2% of students without ADHD reporting any other mental illness (Anastopoulos, et al., 2018). The difference was mostly accounted for by significantly higher levels of anxiety (28.6% versus 3.6%) and depression (32.3% versus 5.4%) between students with and without ADHD, respectively. The most common comorbid anxiety disorder among the students with ADHD was generalized anxiety disorder, and women with ADHD were most likely to meet criteria for a comorbid anxiety disorder. In another study, college students with ADHD were significantly more likely to report a lifetime history of an anxiety disorder on a structured clinical interview compared to

college students without ADHD (O'Rourke, 2014). In addition to clinical interviews, researchers have also used self-report measures to examine anxiety among college students with ADHD. When compared to college students without ADHD, college students with ADHD have reported significantly higher anxiety on broadband behavioral measures (Merket & Gawrilow, 2016; Richards, Rosén, & Ramirez, 1999; Weyandt et al., 2013) and narrowband anxiety measures (Anastopoulos et al., 2018; Prevatt et al., 2015). College students with ADHD also appear to experience elevated test anxiety relative to college students without the disorder (Dan & Raz, 2015; Lewandowski et al., 2013; Prevatt et al., 2015), and may be especially prone to worrying about tests (Nelson, Lindstrom, & Foels, 2014).

Although most researchers have found elevated rates of anxiety among college students with ADHD, a few have not. For instance, college students with ADHD have self-reported comparable levels of anxiety relative to college students with dyslexia and comorbid ADHD and dyslexia (Nelson & Gregg, 2012) and relative to typically developing college students (Heiligenstein et al., 1999; Nelson & Gregg, 2012; O'Rouke, 2014). Even when college students with ADHD report significantly higher anxiety relative to college students without ADHD, the level of anxiety reported may still fall within the normative range (e.g., Weyandt et al., 2013). Only a small proportion (≈ 5%) of college students with ADHD may experience clinical levels of anxiety (Heiligenstein & Keeling, 1995). Taken together, the literature suggests that college students may be at-risk for experiencing higher levels of anxiety relative to typically developing students, but further research is needed to clarify the degree to which that anxiety impacts functional impairment.

Implications of comorbid anxiety. In general, it is hypothesized that there is a curvilinear relationship between anxiety/stress and performance, with performance improving as

anxiety increases until a point at which increasing anxiety is associated with decreasing performance (Teigen, 1994). Thus, comorbid anxiety may have important implications for college students with ADHD, and researchers have found that comorbid anxiety appears to affect cognition. The cognitive implications of comorbid anxiety among children with ADHD have been subject to considerable investigation, and it appears that comorbid anxiety among children with ADHD may decrease impulsivity but increase cognitive inefficiency (e.g., worse performance on working memory tasks) (Jarrett, 2016; Schatz & Rostain, 2006). The cognitive implications of comorbid anxiety among adults with ADHD have been less well examined. In one investigation, state anxiety was a partial mediator between ADHD status and verbal learning and memory dysfunction among adults; adults with ADHD and higher state anxiety evidenced the lowest performance on verbal learning and memory tasks (Roth et al., 2004). The authors speculated that increased anxiety may interfere with encoding and recall processes among adults with ADHD but noted that more research is needed to clarify the cognitive implications of comorbid anxiety among adults with ADHD.

Researchers have begun to examine the cognitive implications of comorbid anxiety disorders for college students with ADHD, but results are mixed. Jarrett (2016) investigated the relationships between ADHD symptoms, anxiety, and executive functioning among college students enrolled in an introductory psychology course. The researcher separated the participants into the following groups based on cut-off criteria on symptom self-report measures: ADHD only, anxiety only, ADHD and anxiety (comorbid), and control (neither ADHD nor anxiety). Students in the comorbid group self-reported statistically significantly greater impairments in emotional control, self-organization, and problem solving relative to all the other comparison groups. Additionally, students in the comorbid group reported significantly greater

impairments in time management relative to the anxiety only and control groups. Based on these results, the author concluded that ADHD with comorbid anxiety exacerbates executive functioning impairments. It is unclear, however, whether these findings apply to college students who have been formally diagnosed with ADHD and/or anxiety because, as noted above, ADHD and anxiety determinations were based on clinical cut-offs on rating scales. Therefore, this sample likely included a mix of students who truly met criteria for ADHD and/or an anxiety disorder as well as students with subthreshold ADHD and anxiety symptoms, and as such, it is difficult to draw conclusions related to how ADHD and anxiety interact among "true" clinical cases.

Prevatt and colleagues (2015) investigated whether comorbid anxiety affected how college students with ADHD performed on various cognitive tasks. Results revealed an interaction between anxiety and cognitive functioning; students with high anxiety and low inattention symptomology performed the best on memory, verbal comprehension, and nonverbal reasoning tasks. Students with high levels of inattention and high anxiety performed the worst on these tasks. Given these results, the authors surmised that comorbid anxiety symptoms may confer some benefit to college students with ADHD when attention is relatively well-developed. In another study, college students with ADHD reported significantly higher test anxiety relative to college students without ADHD, but even with elevated anxiety, the students with ADHD performed similarly to the students without ADHD on a reading examination (Lewandowski et al., 2013). In this case, elevated anxiety did not appear to improve or impair performance. It is important to note, however, the reading examination was a structured task and may not generalize to typical test-taking conditions in the college setting. Taken together, the results from the literature are equivocal regarding the impact of comorbid anxiety on cognitive

functioning among college students with ADHD—it is unclear whether anxiety functions as a risk or protective factor. Another potential implication of comorbid anxiety among college students with ADHD is the impact it may have on students' response to treatment. Research addressing the impact of comorbid anxiety on treatment response among college students with ADHD is limited.

Treatment Options

Although it is well documented that college students with ADHD face many challenges, including impairments in academics and social/emotional functioning, the evidence regarding treatments for college students with ADHD is limited (DuPaul et al., 2009; Fleming & McMahon, 2012; Green & Rabiner, 2012; Murphy, 2005; Weyandt & DuPaul, 2008; Weyandt & DuPaul, 2013). Potential treatment options include pharmacotherapy, academic accommodations, computer-based interventions, and psychosocial interventions, but researchers have only recently begun evaluating these treatments in college populations. In fact, a recent literature review reported that there had been no controlled studies investigating any form of treatment at that time (Green & Rabiner, 2012). A few controlled trials related to specific treatment options have been conducted in the years subsequent to this literature review, but treatment research regarding college students with ADHD is in preliminary stages, and most studies to date are limited by small sample sizes and weak methodologies.

Pharmacotherapy. Stimulant medications are often recommended as a first-line treatment for adults with ADHD (Prevatt & Levrini, 2015) and are widely prescribed for college students with the disorder (DuPaul et al., 2009). There is little research, however, to support the efficacy of stimulant medication with this population (DuPaul et al., 2009). Results from surveys indicate that college students with ADHD who take medications report similar degrees

of academic impairment relative to students with ADHD who do not take medication (Advokat et al., 2011; Blase et al., 2009). To date, only one double-blind, placebo-controlled medication trial has been conducted (Dupaul et al., 2012). DuPaul and colleagues (2012) examined the efficacy of Lisdexamfetamine Dimesylate (LDX; trade named Vyvanse), for college students with ADHD. A total of 24 students with the disorder participated in the trial, which consisted of five, one-week phases (no-medication baseline, placebo, and 30mg, 50mg, and 70mg doses of Vyvanse). Increased doses of Vyvanse led to statistically significant decreases in ADHD symptoms and improvements in executive functioning (planning, task management, study skills, organization, and working memory). Yet, the students with ADHD still exhibited higher ADHD symptoms and more impairment in executive functioning relative to a comparison sample of typically developing peers. Moreover, Vyvanse did not lead to statistically significant changes in psychological and social functioning. Taken together, these findings indicate that college students with ADHD may need other treatments in addition to medication in order to perform commensurately with their peers, but more research is clearly needed.

Accommodations. Academic accommodations are another treatment option typically available to college students with ADHD because the Americans with Disabilities Amendments Act and Section 504 of the Rehabilitation Act require institutions to provide equal access to education for students with disabilities (Jacob, Decker, & Hartshorne, 2011). In order to receive accommodations, students must report their disability and apply for accommodations through university disability support offices (Hamblet, 2014). It is estimated that 25% of the college students who access academic accommodations have a diagnosis of ADHD (Wolf, 2001), and common academic accommodations for students with ADHD include extended time on tests and permission to take tests in a distraction free environment (Ramsay & Rostain, 2007). The

research investigating the efficacy of academic accommodations is limited. Although college students with and without disabilities appear to perceive accommodations as beneficial (Lewandowski, Lambert, Lovett, Panahon, & Sytsma, 2014), it is unclear whether these changes improve outcomes for college students with ADHD (DuPaul et al., 2009).

A few experimental investigations have been conducted to investigate the effects of extended time for college students with ADHD, but the results are equivocal. For instance, in an examination of the effects of standard versus extended time on the performance of college students with and without ADHD on a standardized reading comprehension test, students performed equally under standard time conditions (Miller, Lewandowski, & Antshel, 2015). Moreover, extended time improved performance for students with and without ADHD, calling into question the validity of this accommodation because it did not provide a "differential boost" for the students with the disorder (see Harrison, Bunford, Evans, & Owens, 2013, p. 556). In a similar study, college students with ADHD and typically developing controls both took longer to complete a test involving math, reading comprehension, and nonverbal reasoning when given extended time, but extended time was not associated with significant improvements in their test performance (Jansen, Petry, Evans, Noens, & Baeyens, 2018). In another study, college students who reported high levels of ADHD symptoms experienced less benefit from extended time on a reading comprehension test compared to students who reported low levels of ADHD symptoms (Lovett & Leja, 2015). The authors speculated that students with high levels of ADHD symptomology used the extended time ineffectively. Finally, results from experimental analyses comparing performance of college students with ADHD on computer-paced versus self-paced testing formats (Lee et al., 2008) and computer versus paper and pencil testing formats with and

without extended time (Lee, Osborne, & Carpenter, 2010) have shown that students perform similarly regardless of the amount of time used.

Correlational designs have also been used to explore the impact of accommodations for college students with ADHD. For example, the use of audiobooks, audio-recorded classes, extended time on tests, and a low-distraction testing environment were positively correlated with end-of-year GPA for college students with ADHD (Trammell, 2014). Although these results suggest that there may be an association between accommodations and academic performance, correlational research cannot establish a causal link or show whether the accommodations raised students' performance or lowered academic expectations. Moreover, there do not appear to be significant associations between ADHD status and service use (e.g., accommodations, tutoring) or between service use and final GPA among college students with ADHD (Gormley et al., 2018; Gormley et al., 2016; Wallace, Winsler, & NeSmith, 1999). Taken together, experimental and correlational studies to date do not provide strong support for the use of academic accommodations among college students with ADHD.

Technological interventions. Assisted reading software and working memory training are two computer-based interventions that have been empirically examined for use with college students with ADHD. The effects of an assistive reading computer program that included concurrent auditory and visual text presentation, an electronic dictionary, and study tools (e.g., glossaries, preview features, differential highlighting), were examined among a sample of college students with ADHD using an AB case study design (Hecker, Burns, Katz, Elkind, & Elkind, 2002). Twenty students with ADHD, five of whom had either an additional reading disability diagnosis or a suspected reading disability, participated in two brief reading tasks, one with and one without the assisted reading software. Reading rate was statistically significantly

faster and self-reported fatigue was lower in the assisted reading phase, but no significant differences in reading comprehension were found. Additionally, students who reported being most distracted in the unassisted phase experienced the greatest decline in distractibility under assisted reading conditions. Given these results, the authors concluded that assisted reading software may improve attention and reading rate among college students with ADHD, but it is unclear whether these improvements would translate into other academic benefits (e.g., improved GPA).

Working memory training is a second technological intervention approach and involves computer-based games designed to enhance individuals' ability to temporarily store, process, rehearse, and manipulate verbal and nonverbal information (Rapport, Orban, Kofler, & Friedman, 2013). Meta-analyses investigating the efficacy of working memory training programs for children with ADHD have found that training programs improve performance on similar working memory tasks, but do not consistently improve academic achievement or other functional outcomes (Hodgson, Hutchinson, & Denson, 2014; Melby-Lervåg & Hulme, 2013; Rapport et al., 2013; Sonuga-Barke et al., 2013). Similar results were found in a pilot randomized controlled trial examining the impact of a working memory training program among college students with ADHD and learning disabilities (LD) (Gropper, Gotlieb, Kronitz, & Tannock, 2014). Students either participated in a 5-week, online working memory training program that included weekly phone calls or emails with a coach who helped monitor progress (n = 39) or a wait-list control condition (n = 23). The researchers examined whether the students experienced improvements on similar, untrained working memory tasks (near-transfer effects) and whether students experienced improvement in broader functional impairments (far-transfer effects). Students who received the working memory training experienced statistically

significant improvements on near-transfer tasks and self-reported significant improvements on some far-transfer measures including ADHD symptoms and cognitive failures relative to the control condition; however, there were no significant far-transfer effects on reading comprehension, math reasoning, or neuropsychological measures of attention. Overall, there is insufficient evidence to suggest that assisted reading software or working memory training can improve functional impairment among college students with ADHD.

Cognitive behavioral therapy. Cognitive behavioral therapy (CBT) is a psychosocial treatment designed to target individuals' maladaptive thinking patterns and teach individuals behavioral strategies along with more adaptive thinking patterns (Ramsay & Rostain, 2007). CBT has been widely studied for treating adults with ADHD (LaCount, Hartung, Shelton, & Stevens, 2015). Results from a meta-analysis of eight studies investigating CBT for adults with ADHD revealed a moderate to large effect of CBT on ADHD symptom reduction relative to wait-list control groups (standardized mean difference [*SMD*] = .76) and a small to moderate effect of CBT on ADHD symptom reduction relative to active control groups (*SMD* = .43) (Young, Moghaddam, & Tickle, 2016). It is not clear, however, whether CBT is developmentally appropriate and efficacious for college students with ADHD (He & Antshel, 2016). To date, only three quasi-experimental studies have been conducted examining CBT for college students with ADHD, and all are limited by small sample sizes (*n*s $\leq$ 43).

The first of these studies examined the impact of an 8-week CBT program called *Accessing Campus Connections and Empowering Student Success* (ACCESS). ACCESS uses psychoeducation, cognitive restructuring, and behavioral skills instruction during both group and individual mentoring. In a two-year open trial, 43 college students experienced statistically significant improvements in self-reported behavioral strategy use (e.g., organization, time

management), ADHD knowledge, maladaptive thinking, inattention, and total ADHD symptoms from pre- to post-treatment. Participants were also less likely to be under academic probation when receiving the treatment as compared to the semester prior to treatment, and students reported increased use of campus-based disability support services after receiving the intervention. Based on these results, the authors concluded that ACCESS is a promising intervention for college students with ADHD and that future randomized controlled trials were warranted (Anastopoulos & King, 2014).

In the second study, LaCount, Hartung, Shelton, Clapp, and Clapp (2015) conducted a small-scale open trial of a CBT program for adults that was adapted for use with college students. Twelve undergraduate and graduate students received both group and individual CBT sessions each week over a 10-week period. The treatment protocol addressed the following topics: (a) organization and planning; (b) education about medication; (c) prioritizing tasks; (d) managing overwhelming tasks; (e) gauging attention span and distractibility delay; (f) environmental modification; (g) adaptive thinking; (h) procrastination; and (i) relapse prevention (Safren, Perlman, Spirch, & Otto, 2005). The participants reported statistically significant improvement in inattention symptomology, impairment in school, and impairment in work from pre- to post-treatment. The authors concluded that the adapted CBT intervention holds promise for improving inattention and functional impairment among college students with ADHD (LaCount et al., 2015).

In the third study, the effect of a brief, individual CBT program for college students with ADHD was examined through a case study design. Four students received a CBT treatment that addressed four topics: (a) behavioral skills (e.g., organization, planning), (b) reducing distractibility, (c) adaptive thinking, and (d) additional skills (e.g., procrastination prevention,

maintenance planning). ADHD symptoms—specifically hyperactivity, problems with self-concept, and overall symptoms—showed a trend toward improvement from pre- to post-treatment across participants. Participants also reported less functional impairment after receiving the intervention. The authors concluded that the brief CBT intervention holds promise as a short-term treatment for college students with mild to moderate ADHD symptoms and may be well suited for implementation in on-campus counseling centers (Eddy, Will, Broman-Fulks, & Michael, 2014).

In summary, the research on CBT treatments for college students with ADHD should be interpreted with caution due to the lack of control groups, small sample sizes, and an absence of significance testing comparing treatment and control conditions. The latter limitation raises questions regarding the generalizability of the findings. Still, studies to date suggest that CBT for college students with ADHD is a promising treatment approach.

Dialectical behavior therapy. Dialectical behavior therapy (DBT) is a so-called *third wave* CBT treatment (Fletcher & Hayes, 2005) that was recently examined within a sample of college students with ADHD. DBT is comprised of CBT elements, such as behavioral techniques and cognitive restructuring, but also includes mindfulness/acceptance components (Lynch, Trost, Salsman, & Linehan, 2007). Fleming, McMahon, Moran, Peterson, and Dreessen (2015) conducted a pilot study examining the efficacy of a DBT program for college students with ADHD. Students participated in either an 8-week group DBT program (n = 17), covering psychoeducation, scheduling and organization strategies, mindfulness, emotional regulation, and generalization strategies, or a control condition (n = 16), in which participants were provided with handouts to encourage self-guided skills training. Students who received the DBT intervention found the program acceptable and self-reported statistically significant

improvements in mindfulness, executive functioning, and quality of life post-treatment. Gains in mindfulness and executive functioning were maintained at a three-month follow-up. Further investigation of the efficacy of DBT for college students with ADHD is warranted based on the results of this pilot study, and results suggest that DBT is a potentially promising treatment.

Strategy instruction. Strategy instruction involves explicit teaching of academic skills such as organization, study skills, time management, and planning (Allsopp, Minskoff, & Bolt, 2005). Strategy instruction is similar to CBT and DBT as clinicians help students develop and implement behavioral strategies within all three approaches; however, strategy instruction differs from CBT and DBT in that clinicians do not have an additional focus on addressing students' cognitive or emotional functioning. There are several studies investigating the effects of strategy instruction for college students with ADHD. For instance, LaCount, Hartung, Shelton, and Stevens (2015) examined the efficacy of a brief organization, time management, and planning skills (OTMP) intervention for college students who self-reported high levels of ADHD symptoms. The OTMP intervention was delivered over three group sessions, and students learned specific skills for time awareness and scheduling (e.g., time estimation activities, setting up an organizational system), task management and motivation (e.g., breaking down large assignments, using self-reinforcement), and implementing organizational systems (e.g., using planners, prioritizing). A total of 22 students volunteered to participate in the intervention condition, and 15 students who declined participation in the intervention group served as the no-treatment control condition. Session attendance rates (92%) and student acceptability ratings were high for the OMTP intervention, supporting the feasibility of this approach. Additionally, students in the intervention condition self-reported statistically significantly greater improvement in academic impairment, inattention, and hyperactivity from pre- to post-treatment relative to the

control condition. Yet, both the intervention and control condition reported similar increases in their use of OTMP skills over the course of the study. The authors concluded that these results provide preliminary support for the usefulness of brief, group-based strategy instruction interventions for college students with ADHD. Because students self-selected into the intervention and control conditions, these results should be interpreted with caution. It is possible that differences between students who self-selected into the intervention condition, such as higher motivation to improve their academic skills, account for the intervention effects.

In another study of strategy instruction, 46 college students with ADHD (21%), a learning disability (57%), or both received weekly, individual strategy instruction (e.g., clinician modeling of strategy use, guided practice) in organization, note taking, test taking, studying, critical thinking, reading, writing, and math over the course of one or two semesters (Allsopp et al., 2005). Statistically significant improvements in GPA between the semester before and during intervention implementation were found, and gains were maintained during the semester after strategy instruction was completed. The intervention was particularly effective for students who were on academic probation prior to receiving the intervention. Additionally, the researchers concluded that improvement in GPA could be attributed to strategy instruction (based on case note documentation of the extent of students' independent strategy use) for half of the students in the sample. Given these results, the authors suggested that course-specific strategy instruction may be beneficial for college students with ADHD and/or LD. The authors did not examine whether there were differences in results between students with ADHD versus students with LD, and therefore, it is unclear whether strategy instruction benefits students with ADHD specifically.

Farmer, Allsopp, and Ferron (2015) investigated the impact of a strategy instruction program, called the Personal Strengths Program (PSP), on the self-determination of college students with ADHD and/or LD using a multiple baseline design. Seven undergraduate and graduate students participated in this study. The PSP is an 8-session intervention and includes material on self-awareness, character strengths, learning strengths, assertive communication and negation, using feedback, and generalization/maintenance. Students worked one on one with a coach who used both questioning and explicit instruction to help students develop and achieve goals in each of the targeted areas. Students completed a brief self-determination rating scale three times a week throughout the duration of the study and also completed a standardized self-determination questionnaire at pre-, mid-, and post-treatment. Students reported a statistically significant improvement in self-determination on the standardized measure, but there were no clear trends in changes in self-determination on the weekly self-determination ratings. Students qualitatively reported that the PSP helped them avoid decreases in self-determination that are usually experienced as the semester progresses. The researchers concluded that the PSP may have positive implications for self-determination among college students with ADHD and/or LD. It is important to note the authors did not report how many students in their sample had a diagnosis of ADHD, so it is unclear how these findings may generalize to other college students with ADHD.

Although the studies discussed above indicate that explicit strategy instruction may be a promising intervention for college students with ADHD and/or LD, other findings indicate that strategy instruction alone may not be sufficient to improve functioning among college students with ADHD. Specifically, Scheithauer and Kelley (2017) examined the additive effects of self-monitoring on a study skills strategy instruction intervention. Students who had a diagnosis of

ADHD were randomly assigned to a study skills plus self-monitoring condition (SM+; *n* = 22) or a study skills only condition (SM-; *n* = 19). Students in both conditions received an individual session lasting 20-30 minutes in which a clinician reviewed informational handouts on a specific reading strategy and general study skills. Students in the SM+ condition then received additional instruction on self-monitoring procedures (e.g., setting goals, using a form for monitoring progress) and filled out self-monitoring forms daily. Following this, students in both conditions participated in two check-in sessions. For students in the SM+ condition, self-monitoring data were reviewed during check-ins and the clinician discussed strategies for making improvements when goals were not met. For students in the SM- condition, the clinician engaged participants in discussion about their use of study skills during check-in sessions. Students in the SM+ condition reported statistically significant improvements in ADHD symptoms, GPA, goal attainment, and academic behavior (i.e., test taking, reading, and inattention) from pre- to post-treatment, and the students in the SM+ condition had statistically significantly greater improvement in ADHD symptoms and goal attainment post-treatment relative to the SM- group. Based on these findings, the researchers speculated that self-monitoring/goal setting may be an important and beneficial component to add to strategy instruction interventions for college students with ADHD.

ADHD Coaching

Overall, the literature regarding treatment options for college students with ADHD is limited (DuPaul et al., 2009; Fleming & McMahon, 2012; Green & Rabiner, 2012; Murphy, 2005; Weyandt & DuPaul, 2008; Weyandt & DuPaul, 2013). Across the various treatment approaches discussed thus far, few studies have been conducted within each treatment approach, and the studies that have been conducted are incapable of demonstrating causation. ADHD

coaching is an alternative psychosocial treatment that has been subjected to rigorous testing with adults. Coaching is designed to target core academic impairments related to ADHD including organization, time management, study skills, and note-taking (Field, Parker, Sawilowsky, & Rolands 2013; Prevatt, 2016; Prevatt & Lee, 2009; Prevatt & Levrini, 2015; Swartz, Prevatt, & Proctor, 2005; Zwart & Kallemeyn, 2001). Although the skills targeted in coaching are similar to those targeted in strategy instruction, the interaction between students and the interventionist differs substantially between coaching and strategy instruction (Parker, Hoffman, Sawilowsky, & Rolands, 2011; Parker, Hoffman, Sawilowsky, & Rolands, 2013). Coaching involves a collaborative relationship between the clinician and the student with ADHD, and instead of directly teaching students skills, coaches use a Socratic process to empower students to develop and use new, effective skills. Students ideally learn from coaches' questions and internalize the Socratic process, which allows students to self-regulate strategy use. Coaches typically meet with students weekly or biweekly, and meetings involve long-term goal setting and monitoring progress on weekly objectives. It is important to note that coaching is not intended to address severe cognitive, emotional, or behavioral problem and is not designed to replace psychotherapy (Goldstein, 2005). Prevatt and Levrini (2015) describe coaching as a "just do it approach" (p. 30) because it is results-oriented and pragmatic as opposed to insight-oriented.

Coaching has become a popular treatment option during the past decade, and although empirical examinations of coaching are promising (Field et al., 2013; Prevatt, 2016), there is still insufficient evidence to support the efficacy of coaching for college students with ADHD (Fleming & McMahon, 2012; Goldstein, 2005; Prevatt, 2016). Nevertheless, several investigations have established coaching as a potentially promising treatment approach for college students with ADHD. To date, the literature examining the effects of coaching for

college students with ADHD includes one large randomized controlled trial, four quasi-experimental studies, three qualitative studies, two case studies, and one doctoral dissertation. Table 1 summarizes the research literature examining ADHD coaching for college students to date. For brevity, I will highlight findings from the experimental and quasi-experimental studies below.

Experimental research. Field and colleagues (2013) conducted a randomized controlled trial examining the effects of the Edge coaching model on learning and study strategies and wellbeing among college students with ADHD. Relative to students in the control condition, students who received the coaching intervention self-reported statistically significantly higher overall learning and study strategies on the *Learning and Study Strategies Inventory* (LASSI; Weinstein & Palmer, 2002) at post-treatment while controlling for pre-treatment scores. Large within-group effect sizes for the overall LASSI score (d = 1.02) and the self-regulation subscale (d = 1.10) were calculated for the students in the treatment condition. Students in the treatment condition also reported statistically significantly higher wellbeing at post-treatment while controlling for pre-treatment LASSI scores relative to the control condition. Self-reported comorbid conditions (including anxiety, depression, oppositional defiant disorder, learning disability, obsessive compulsive disorder, Tourette's syndrome, autism, or bipolar disorder), did not appear to have a major impact on students' response to treatment. In a report submitted to the Edge Foundation based on the data collected from this study, Field, Parker, Sawilowsky, and Rolands (2010) reported that there were no significant differences in students' GPA between conditions. Given these results, the researchers concluded that coaching is an effective intervention for addressing executive functioning difficulties among college students with ADHD, but there may be no demonstrable impacts on academic outcomes.

Table 1

Summary of Coaching Research

Type	Researchers	Sample	Coaching Intervention	Outcomes	Summary
Randomized Controlled Trial	Field et al., (2013)	Undergraduate students with ADHD across 10 universities were randomly assigned to the coaching condition (n = 88) or the control condition (n = 39)	Weekly phone sessions over 6 months focusing on organization, scheduling, goal setting, prioritizing, persistence, focus, and confidence.	Learning/study strategies, wellbeing	Students who received the coaching intervention self-reported statistically significantly higher overall learning and study strategies and wellbeing at post-treatment relative to the control condition while controlling for pre-treatment scores. Self-reported comorbid conditions did not affect students' response to treatment.
Quasi-Experimental	Prevatt & Yelland (2015)	Undergraduate and graduate students with ADHD and/or LD at a large public university (N = 148)	8-week coaching model consisting of weekly individual, face-to-face meetings. Coaches help students set long-term goals and monitor progress on short-term goals.	Learning/study strategies, self-esteem, functional impairment, symptom checklist, coach ratings of motivation	Students self-reported statistically significant improvements in time management, concentration, self-esteem, social role, and symptom distress from pre- to post-treatment. Positive response to treatment was associated with higher quality between-session assignment completion and lower levels of initial anxiety and depression. The authors concluded that high anxiety and depression hinder positive response to treatment.
	Zwart & Kallemeyn (2001)	Undergraduate students with ADHD and/or LD at a private university. Peer coaching intervention (n = 22), recruited control condition (n = 20)	One semester of peer-based coaching (average 5.5 sessions) targeting time management, organization, study skills, and self-advocacy.	Learning/study strategies, self-efficacy	Students in the peer coaching condition self-reported statistically significantly greater improvements in self-efficacy, motivation, attitude, time management, anxiety, test preparation, and selecting main ideas relative to students in the control condition.
	Richman et al., (2014)	Undergraduate and graduate students with ADHD and/or LD who volunteered for the coaching condition (n = 16) or comparison condition (n = 8)	12 to 24 in person and phone sessions over two semesters focusing on setting and developing plans to achieve specific, measurable goals	Learning/study strategies, executive functioning, self-determination, qualitative interviews	There were no significant differences between conditions in the quantitative outcome measures, but results trended in the expected direction with the students in the coaching condition reporting improvements from pre-to post-treatment. Qualitative findings indicated that coaching improved students' self-determination, executive functioning, and academic skills.

Type	Researchers	Sample	Coaching Intervention	Outcomes	Summary
Quasi-Experimental	Prevatt, Lampropoulos, et al., (2011)	College students with ADHD at a large public university (*N* = 13)	8-week coaching model consisting of weekly individual, face-to-face meetings. Coaches help students set long-term goals and monitor progress on short-term goals.	ADHD Coaching Outcomes	Examination of coach perceptions of clients between session assignment (BSA) completion. Positive response to treatment was significantly positively correlated with coach ratings of BSA quality, usefulness of BSA, client attitude toward BSA, and client motivation to please parents. Men were significantly more likely to complete BSA than women. Overall, BSA appears useful in ADHD coaching.
Qualitative	Parker et al., (2013)	Undergraduate students with ADHD, subsample from Field et al., 2013 (*N* = 19)	Weekly phone sessions over 6 months focusing on organization, scheduling, goal setting, prioritizing, persistence, focus, and confidence.	Qualitative interviews	Overall themes related to benefits of coaching were: improved self-regulation, more effective beliefs, increased positive feelings (confidence, empowerment), and the accountability and support inherent in the coaching relationship. Coaching appears to help students use more effective self-regulation strategies to manage academic impairments.
	Parker et al., (2011)	Undergraduate students with ADHD, pilot phase from Field et al., 2013 (*N* = 7)	10 weekly, phone-based coaching sessions for one semester.	Qualitative interviews, GPA, learning/study strategies	Coaching helped students develop new time management strategies, increase confidence, manage daily stress, and improve their ability to create and achieve specific goals and break down large tasks into small components. GPA increased from pre- to post-treatment among 4 students, and there was improvement in learning/study strategies from pre- to post-treatment for all participants.
	Parker & Boutelle (2009)	Students with ADHD and/or LD at a 2-year postsecondary institution (*N* = 7)	Weekly face-to-face or phone sessions focusing on time management, organization, stress management, and work/life balance.	Qualitative interviews	Broad themes were that coaching: involved an equal partnership that facilitated students' ability to develop new strategies, allowed students to develop competencies (e.g., time management, self-talk) that enabled them work toward goals with enhanced self-determination, and enhanced overall well-being by reducing stress and anxiety.

Type	Researchers	Sample	Coaching Intervention	Outcomes	Summary
Case Studies	Prevatt & Lee (2009)	Man in freshman year of undergrad diagnosed with ADHD (*N* =1)	8-week coaching model consisting of weekly individual, face-to-face meetings. Coaches help students set long-term goals and monitor progress on short-term goals.	Learning/study strategies, self-esteem, GPA	The student focused on time management and study habits. He had low compliance in completing between session assignments and self-reported moderate pre-post improvement in self-esteem, minimal improvement in learning and study strategies, and there was no improvement in GPA. The authors recommended that goals be written down during sessions and that when clients have low motivation, coaches should consider helping clients develop and implement external reward systems.
	Swartz et al., (2005)	Woman in senior year of undergrad diagnosed with ADHD, major depression, and generalized anxiety disorder (*N* =1)	8-week coaching model consisting of weekly individual, face-to-face meetings. Coaches help students set long-term goals and monitor progress on short-term goals.	Learning/study strategies, coaching topics survey	The student focused on developing time management skills and self-reported improvements in time management, establishing routines, organization, keeping track of materials, studying, waking up, paying attention in class, and planning/prioritizing from pre- to post-treatment; it was not reported whether the improvements were clinically significant.
Dissertation	Reaser (2008)	Undergraduate students with ADHD (*N* =7)	8-week coaching model consisting of weekly individual, face-to-face meetings. Coaches help students set long-term goals and monitor progress on short-term goals.	Learning/study strategies, qualitative interviews	The majority of the students met their long-term goals and self-reported improvements on the LASSI from pre- to post-treatment. Students reported that coaching helped improve their organization, focus, sense of control, and self-awareness and that coaching was more effective than other treatment options (e.g., counseling, medication) due to its practicality and inherent accountability.

Note: ADHD = attention-deficit/hyperactivity disorder; LD = learning disability

Quasi-experimental research. Prevatt and Yelland (2015) conducted a quasi-experimental, exploratory study investigating the efficacy of an 8-week coaching program for college students with ADHD. Students self-reported statistically significant improvements on the LASSI from pre- to post-treatment with the largest gains in time management (d = .89) and concentration (d = .76). Students also self-reported statistically significant improvement in self-esteem (d = .43), social role (satisfaction with school or work functioning; d = .83), and symptom distress (d = .58). Positive response to treatment was correlated with client willingness to work on between session assignments, client perceptions of between session assignment relevance, and coach perceptions of client compliance, quality, and time commitment to between session assignments. Positive treatment response was also significantly correlated with initial self-reported depression and anxiety, with lower levels of depression and anxiety associated with better treatment response. Specifically, lower levels of initial anxiety were correlated with greater improvement in time management (r = .31), test strategies (r = .31), use of study aides (r = .46), selecting main ideas (r = .32), and anxiety (r = .28) as measured by the LASSI. Lower initial levels of depression were also associated with better response to the coaching intervention. Based on these results, the authors concluded that high anxiety and depression hinder positive response to intervention and that students with lower comorbid anxiety benefit more from coaching, but an alternative explanation could be that students with low anxiety experience greater improvement because these students have more to gain from treatment. The lack of a control condition or analysis of the correlations between anxiety and pre-treatment academic skills in this study precluded the examination of this other possibility. Overall, the researchers concluded that their findings provided preliminary support for the efficacy of coaching for

college students with ADHD and noted that future research using randomized controlled designs is needed to further establish the efficacy of coaching.

Zwart and Kallemeyn (2001) conducted a quasi-experimental study to examine the impact of a peer coaching intervention for college students with ADHD and/or LD on students' learning and study strategies and self-efficacy. Students in the peer coaching condition self-reported statistically significantly greater improvement in self-efficacy and motivation, attitude, time management, anxiety, test preparation, and selecting main ideas on the LASSI relative to students in the control condition. It is important to note that significantly more students in the peer coaching condition had a diagnosis of ADHD relative to students in the control condition. In a comparison of the students in the experimental condition with an ADHD diagnosis to the students in the control condition with an ADHD diagnosis, results for changes in self-efficacy were equivocal, but the students in the peer coaching condition still experienced statistically significant improvement in motivation, anxiety, time management, test taking, and selecting main ideas relative to the students with ADHD in the control condition. The researchers concluded that peer coaching for college students with ADHD and/or LD is promising, especially for improving students' time management and motivation.

Richman, Rademacher, and Maitland (2014) conducted a quasi-experimental, mixed-methods study to examine the impact of coaching on the executive functioning, self-determination, and learning and study strategies among college students with ADHD and/or LD. Comparisons of changes in self-reported executive functioning, self-determination, and learning and study strategies between the treatment and control conditions were equivocal, which may have been a result of the underpowered sample; nevertheless, results trended in the expected direction with students in the coaching condition reporting pre-posttest improvements relative to

the control condition. The researchers also qualitatively explored the effect of coaching on students' self-determination, executive functioning, and academic skills. Students indicated that coaching improved their self-determination by enhancing their self-esteem, self-awareness, and ability to set and work toward realistic goals and critically reflect on progress. In relation to executive functioning, students reported that coaching helped improve their self-talk, emotion regulation, problem solving, planning, task initiation, and persistence. Academically, students reported that coaching helped improve their GPA, ability to write papers and turn in assignments on time, self-advocacy, and persistence. Based on these results, the researchers recommended that coaching services be made available to college students with ADHD and/or LD.

Taken together, the results from the studies to date provide preliminary support for the efficacy of coaching for college students with ADHD. Researchers have consistently found that coaching is associated with improvements in students' academic skills and appears to enhance students' self-regulation, but few have examined the impact of comorbid conditions on ADHD coaching efficacy. Given the prevalence of anxiety among college students with ADHD, it is critical to examine the moderating impact of these symptoms on treatment outcomes in order to better understand how and when this treatment works.

Statement of the Problem and Significance of the Study

College students with ADHD experience many impairments in the college setting including poor academic achievement (e.g., Gormley et al., 2016), an increased risk for comorbid anxiety (e.g., Anastopoulos et al., 2018), and specific deficits in critical academic skills such as time management, organization, study strategies, and note-taking (e.g., Reaser et al., 2007). Coaching is a psychosocial treatment approach that directly targets core academic skills, and there is preliminary support that coaching improves learning and study strategies as

well as self-regulation among college students with ADHD (Prevatt, 2016). Although the evidence for coaching for college students with ADHD is promising, the literature is limited because there has been an inadequate focus on the impact of comorbid conditions on students' response to coaching treatments; at this point it is unclear which students are most likely to benefit from coaching. Preliminary findings suggest that college students with ADHD and low levels of comorbid anxiety may respond the best to treatment (Prevatt & Yelland, 2015), but more research is needed to determine the impact of comorbid anxiety on treatment response.

The purpose of this study was to examine the extent to which trait anxiety moderates students' response to ADHD coaching. In a pilot study, I found that students with ADHD and low anxiety who received a coaching intervention reported the largest improvements in most outcomes including executive functioning, metacognition, ADHD symptoms, time management, and organization (Kininger, Schultz, Faulkner, & Gaither, 2016). Conversely, students with low anxiety in the control condition generally reported the worse outcomes over time, and students with the highest relative levels of anxiety experienced little change overtime regardless of treatment status. The findings are preliminary, given that the moderation analyses were underpowered, but tentatively suggest that comorbid anxiety may be a protective factor for college students with ADHD. In other words, anxiety might cause the student with ADHD to worry about his/her college performance and adjust his/her behavior accordingly, whereas a lack of anxiety might blunt the cues for change. If this is true, treatments for this population will need to be modified to address the unique risks in the low-anxiety subgroup. It may also be true that extreme levels of anxiety introduce complications that make students unlikely to benefit from ADHD coaching alone.

The present study extends my pilot study by enrolling additional participants in order to obtain an adequate sample size to detect statistically significant results in moderation analyses. Additionally, the pilot phase of the project led to the development of a novel, standardized coaching intervention. Specifically, this study investigated (a) the acceptability of and students' satisfaction with the coaching treatment; (b) the degree to which coaching improved GPA, executive functioning, learning and study strategies, and ADHD symptoms over a treatment-as-usual (TAU) (e.g., classroom accommodations) control; and (c) the moderating effect of anxiety on treatment outcomes. The first two aims examined the degree to which the current approach to ADHD coaching is comparable to published efforts, and the third aim advanced the literature by examining the extent to which anxiety moderated treatment response. The specific hypotheses of this study were as follows:

1. College students with ADHD will find the coaching treatment acceptable and will be satisfied with the intervention.
    a. Students will rate the coaching intervention as significantly more acceptable relative to students in the TAU control condition, consistent with previous research.
    b. Students in the coaching condition will be significantly more satisfied with the intervention relative to students in the TAU control condition, consistent with previous research.
    c. Students in the coaching condition will identify more perceived benefits of the intervention compared to students in the TAU control condition, consistent with previous research.

2. College students with ADHD who receive the coaching treatment will have better outcomes compared to the TAU control group in all or some psychoeducational areas.
    a. Students in the coaching condition will experience a significant improvement in GPA from pretest to posttest relative to the TAU control condition, consistent with previous research.
    b. Students in the coaching condition will self-report a significant decrease in global executive functioning impairment and metacognitive impairment from pretest to posttest relative to the TAU control condition, consistent with previous research.
    c. Students in the coaching condition will self-report significant improvements in time management, organization, note-taking, and study skills from pretest to posttest relative to the TAU control condition, consistent with previous research.
    d. Students in the coaching condition will self-report a significant decrease in total ADHD symptoms from pretest to posttest relative to the TAU control condition, consistent with previous research.
3. When predicting outcomes, there will be a significant interaction between treatment status and anxiety, indicating that anxiety moderates the relationship between ADHD coaching and psychoeducational outcomes. More specifically, students with low anxiety will experience higher post-treatment GPA, metacognition, global executive functioning, time management, organization, note-taking, study skills, and ADHD symptoms relative to students with high anxiety, particularly in the coaching condition.

CHAPTER II: METHOD

Participants

Participants were recruited from the Disability Support Services office (DSS) at East Carolina University (ECU), which serves approximately 800 students each year. Undergraduate students ages 18 to 24 who submitted documentation to DSS supporting a diagnosis of ADHD and were approved for academic accommodations through DSS were eligible to participate. Students with severe physical conditions (e.g., deaf or blind) and/or severe comorbid mental health conditions including borderline personality disorder, antisocial personality disorder, post-traumatic stress disorder, major depression, bipolar disorder, and psychosis were excluded from the study because individuals with these conditions would likely need more intensive services than what could be provided through the coaching intervention (Goldstein, 2005).

Recruitment procedures. Recruitment occurred in three phases. In the summer of 2015, students were recruited for the pilot phase of the project (cohort 1), which took place during the fall 2015 semester. Students were recruited for the larger-scale project in the summer of 2017 (cohort 2) and the winter of 2018 (cohort 3). The following recruitment strategies were used across all three cohorts. All students who were registered with DSS were sent an email with information about the study at the beginning of each recruitment period, and on an approximately weekly basis thereafter until the middle of the semester. Additionally, flyers advertising the study were posted in the DSS office during the fall 2015, fall 2017, and spring 2018 semesters. The flyers gave a brief description of the study and contained the researcher's email address. Finally, eligible students were recruited in person during routine office appointments. Either the researcher or the Director of Students Services informed eligible students about the study and gave them a copy of the flyer.

Students who were interested in participating were asked to email the researcher for additional information, and all who contacted the researcher were scheduled for an intake appointment. At that time the student received informed consent procedures that were approved by the Institutional Review Board at ECU and completed an intake assessment (described below). Any candidate with an excluded condition (e.g., borderline personality disorder) was given information about the on-campus counseling center (ECU Center for Counseling and Student Development) and encouraged to make an appointment with a mental health professional.

Incentives. To encourage participation in the study, the following incentives were offered. Participants in cohort 1 received a $25 gift card for completing the pre-treatment questionnaires and a $50 gift card for completing the post-treatment questionnaires. Participants in cohorts 2 and 3 who completed the pre-treatment questionnaires received a $10 gift card and were entered into a lottery to win one of two $50 gift cards. The pre-treatment lottery drawings took place at the beginning of the fall 2017 and spring 2018 semesters, and participants were eligible to win a $50 gift card during the semester in which they participated in the study. Participants in cohorts 2 and 3 received an additional $10 gift card for completing the post-treatment questionnaires along with entry into a post-treatment lottery for one of two $50 gift cards. Again, participants were eligible to win a post-treatment $50 gift card during the semester in which they participated in the study.

Sample size. During the pilot phase, a total of 44 students contacted the researcher expressing interest in being involved in the study, and following intake procedures, 20 individuals were accepted into the study. For cohort 2, a total of 31 students expressed interest in being involved in the study, and 21 students were accepted into the study following intake

procedures. For cohort 3, a total of 35 students expressed interest in being involved in the study, and 19 students were accepted into the study after intake procedures. One student in cohort 3 who was randomly assigned to the treatment condition dropped out of the study before receiving any coaching treatment sessions due to time constraints with his schedule and is excluded from analyses. Therefore, the total sample for this study consisted of 59 individuals. Figure 1 depicts the flow chart of inclusion and exclusion for participants in cohorts 1, 2, and 3.

Sample demographics. A total of 59 students participated in the study with 30 participants randomly assigned to the coaching treatment condition and 29 randomly assigned to the control condition. The participants were primarily White (78%) women (64%) in their junior year of college (34%). The average age of participants was 20.05 (*range* = 18-24), and 85% of the participants reported taking medication for ADHD. Demographic information is summarized in Table 2. Chi-square analyses revealed no significant differences in sex, $\chi^2(1) = 1.60$, $p = .21$, race $\chi^2(4) = 6.38$, $p = .17$, year in school $\chi^2(4) = 3.78$, $p = .44$, or medication status $\chi^2(1) = 1.06$, $p = .30$, between treatment and control conditions.

Figure 1

Recruitment Flow Chart

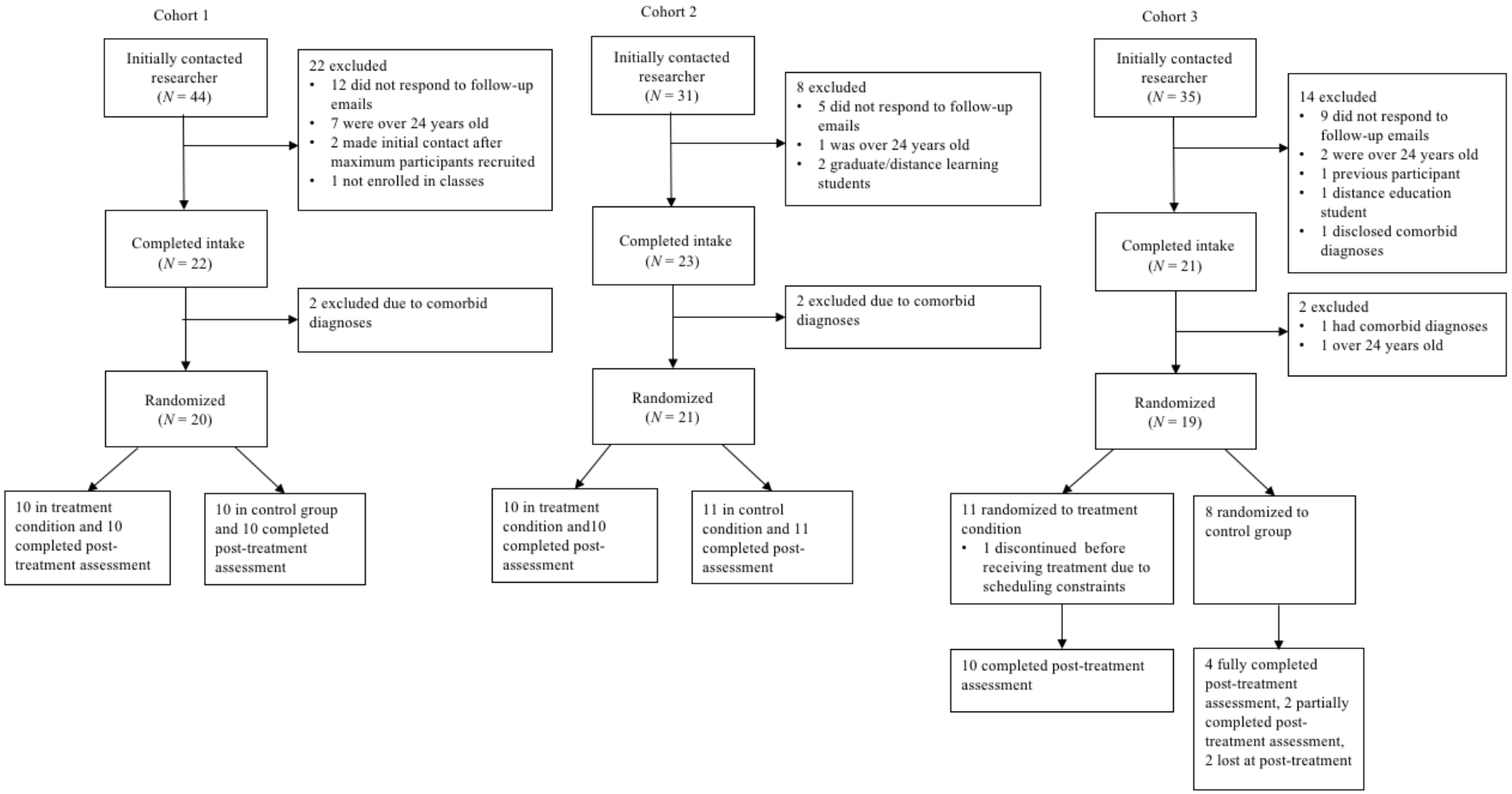


Table 2

Sample Demographics (N = 59)

Variable	*N*	%	Treatment	Control
Gender				
Women	38	64	17	21
Men	21	36	13	8
Race/Ethnicity				
White/Caucasian	46	78	27	19
Black/African American	9	15	3	6
Biracial	2	3	0	2
Hispanic	1	2	0	1
Asian	1	2	0	1
Year in School				
Freshmen	5	9	1	4
Sophomore	16	27	10	6
Junior	20	34	10	10
Senior	12	20	5	7
Senior +	6	10	4	2
Medication Status				
Taking Medication	50	85	24	26
Not Taking Medication	9	15	6	3

Measures

Beginning with the intake assessment, participants completed the following measures. Except when otherwise specified, participants in all three cohorts completed each measure.

The Structured Clinical Interview for DSM-5, Clinical Version (SCID-5-CV; First, Williams, Karg, & Spitzer, 2015) is a structured clinical interview developed to help identify psychiatric disorders according to *DSM-V* criteria among adults ages 18 and older. The SCID-5-CV was used to screen for post-traumatic stress disorder, major depression, bipolar disorder, and psychosis among participants in cohorts 2 and 3 at the intake appointment. The SCID-5-CV includes guidelines for diagnosis (e.g., a specific number of symptoms endorsed). The researcher followed SCID-5-CV guidelines for diagnosis when screening for comorbid conditions. The reliability of the previous version of the SCID (SCID-I), which uses *DSM-IV*

diagnostic criteria, is well established. For instance, the SCID-I has moderate to high test-retest reliability for major depressive disorder (r = .61) and post-traumatic stress disorder (r = .78) (Zanarini et al., 2000). The SCID-I also has high inter-rater reliability with Kappa values ranging from 0.66 to 1.00 (Lobbestael, Leurgans, & Arntz, 2011; Zanarini et al., 2000). To date the reliability and validity of the SCID-5-CV have not been reported. Given that this measure is the most current adult structured interview available and was reportedly designed to enhance the reliability and validity of the SCID-I (First et al., 2015), it was the most appropriate diagnostic interview for this study.

The Children's Interview for Psychiatric Syndromes (ChIPS; Weller, Weller, Rooney, & Fristad, 1999) was used to screen for comorbid conditions among participants in cohort 1. The oppositional defiant disorder (ODD), conduct disorder (CD), major depression, mania, psychosis, and post-traumatic stress disorder modules were administered. The ChIPS is a brief, semi-structured clinical interview designed to help identify psychiatric disorders among children ages 6-18 according to DSM-IV. The ChIPS was used because extant adult interview schedules did not include modules for ODD or CD, which are common comorbidities among individuals with ADHD. The researcher made minor changes in wording to ensure that the questions were appropriate for young adults. The reliability and validity of the ChIPS have been established in several studies (Weller, Weller, Fristad, Rooney, & Schecter, 2000). For instance, concordance of symptom identification between the ChIPS and the Diagnostic Interview for Children and Adolescents-Revised-Child Version (DICA-R-C) is high, ranging from 77.5% agreement to 100% agreement (Fristad et al., 1998).

The McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003) is a 10-item self-report screening measure developed to identify

individuals who may have borderline personality disorder. The MSI-BPD was administered during the intake appointment in order to screen out participants who experienced symptoms consistent with borderline personality disorder. Specifically, individuals who score a seven or above on the MSI-BPD have a high likelihood of meeting diagnostic criteria for borderline personality disorder. The researcher followed-up with interview questions when students scored at or above this cut-off before excluding such students in order to assure that all items were understood and answered carefully. The MSI-BPD has adequate internal consistency (α = .74) and test-retest reliability (r = .72), along with good sensitivity (81%) and specificity (85%) in identifying individuals with borderline personality disorder diagnoses.

The Structured Clinical Interview for DSM-IV-TR Axis II Personality Questionnaire (SCID-II PQ; First, Gibbon, Spitzer, Williams, & Benjamin, 1997) was used to screen for antisocial personality disorder among participants in cohorts 2 and 3. More specifically, the 15 yes or no questions from the SCID-II PQ related to antisocial personality disorder were used for this study. Participants who reported three or more symptoms consist with antisocial personality disorder were excluded from the study. The researcher followed-up with interview questions when students scored at or above this cut-off before excluding such students in order to assure that all items were understood and answered carefully. The SCID-II PQ has high sensitivity (94%) but low specificity (39%) in identifying patients with antisocial personality disorder (Nussbaum & Rogers, 1992). Correctly identifying participants with significant antisocial personality disorder symptoms was most important given the aims of this study, and as such, the SCID-II was appropriate for use.

The Patient Health Questionnaire (PHQ-9; Spitzer et al., 1999) is a brief screener for measuring the severity of individuals' depression symptoms. Participants in cohorts 2 and 3

completed the PHQ-9 at intake as a measure of their depression symptoms. Participants' scores on the PHQ-9 were considered along with their responses on the SCID-V-CV to determine inclusion/exclusion in the study. The PHQ-9 has high internal consistency (α = .89) as well as high sensitivity (88%) and specificity (88%) in identifying individuals with major depression (Kroenke, Spitzer, & Williams, 2001).

The Behavior Intervention Rating Scale (BIRS; Elliott & Treuting, 1991) is a 24-item measure assessing individuals' perceptions of treatment appropriateness and effectiveness through a 6-point Likert response format. A total of 13 items on the BIRS pertaining intervention acceptability were used for this study, and participants completed the BIRS at the end of the semester in which they participated in the study. The internal consistency of the original 15 items assessing treatment acceptability is high (α = .97). A factor analysis has supported the three-factor structure of the BIRS consisting of the hypothesized treatment acceptability, effectiveness, and time factors, providing evidence of content and construct validity.

The Treatment Satisfaction Survey (Canu & Bearman, 2011) is a five item self-report measure that assesses participants' satisfaction with treatment through a five-point Likert response format. The *Treatment Satisfaction Survey* was administered to participants at the end of the semester to assess participants' satisfaction with the intervention. This instrument has high internal consistency (α = .81).

The ADHD Benefits of Coaching Scale (ABCS; Deal et al., 2015) is a 10-item self-report measure that assesses perceived benefits of coaching through a six-point Likert response format. Participants in cohorts 2 and 3 completed the ABCS at the end of the semester in which they participated in the study. This measure was developed by Deal and colleagues (2015) to

evaluate the benefits of coaching for college students with ADHD, and the items on the scale were generated through interviews with college students who received ADHD coaching as well as clinicians who provided coaching to college students with ADHD. The internal consistency of the ABCS is high (α = .89), and all 10 items on the scale adequately discriminated between a group of students who had received coaching and a group of students who had not received coaching. Additionally, the ABSC is strongly correlated with the Self-Management to Time subscale of the *Barkley Deficits in Executive Functioning Scale-Long Form* (Barkley, 2011), providing evidence of construct validity.

The Beck Anxiety Inventory (BAI; Beck & Steer, 1993) is a 21-item self-report questionnaire assessing the severity of individuals' anxiety symptoms. Participants completed the BAI at the beginning of the semester in which they are enrolled in the study. The BAI has adequate test-retest reliability over a one-week span (r = .75) and high internal consistency (α = .92) (Beck, Epstein, Brown, & Steer, 1988). The BAI is moderately correlated with other anxiety measures, which provides evidence of adequate concurrent validity (Nelson & Gregg, 2012). Additionally, the BAI is weakly correlated with depression measures, which supports the discriminant validity of the BAI.

Grade Point Average (GPA). Participants' overall grade point average for the semester prior to being enrolled in the study and at the end of the semester in which they were enrolled in the study was collected as an index of academic achievement. During the informed consent process, participants gave the principal investigator permission to obtain their GPA through DSS records.

The Behavior Rating Inventory of Executive Function—Adult Version (BRIEF-A; Roth, Isquith, & Goia, 2005) is a 75-item self-report measure that assesses higher order

cognitive skills. Specifically, the BRIEF-A yields three composite scales: Global Executive Composite, Behavior Regulation Index, and Metacognition Index, along with nine subscales: inhibit, emotional control, self-monitor, shift, initiate, working memory, plan/organize, task monitor, and organization of materials. Participants completed the BRIEF-A at the beginning and end of the semester. The BRIEF-A has high test-rest reliability over a four-week span (r = .82 - .93) and adequate internal consistency (α > .73). Exploratory factor analyses have supported the two-factor structure consisting of the Behavior Regulation Index and Metacognition Index, providing evidence for sound construct validity. The BRIEF-A is moderately to strongly correlated with other self-report measures of executive functioning, providing evidence of adequate concurrent validity.

The School Motivation and Learning Strategies Inventory, College Form (SMALSI; Stroud & Reynolds, 2006) is a 164-item self-report that assesses the following academic skills: test-taking strategies, study strategies, note-taking/listening skills, reading/comprehension strategies, writing/research skills, time management, organizational techniques, academic motivation, concentration/attention difficulties, and test anxiety. Participants completed the SMALSI at the beginning and end of the semester. The SMALSI subscales have adequate internal consistency, with Cronbach's alphas ranging from .73 to .92. Additionally, the SMALSI College Form was standardized using a geographically and ethnically representative sample of college students in the United States.

The Barkley Adult ADHD Rating Scale-IV (BAARS-IV; Barkley, 2011) is a 30-item self-report instrument that assesses the following ADHD symptoms: inattention, hyperactivity, impulsivity, and sluggish cognitive tempo. Participant in cohorts 2 and 3 completed the BAARS-IV at the beginning and end of the semester. The BAARS-IV has high internal

consistency (α = .92) and adequate test-retest reliability over a 2- to 3-week time span (r = .75). The BAARS-IV also is correlated with other self-report measures of ADHD symptomology and adequately discriminates between adults with and without ADHD, which supports the validity of this measure.

Conners' Adult ADHD Rating Scale, Self-Report, Long Version (CAARS-S:L; Conners et al., 1999) is a 66-item self-report instrument that assesses four factors associated with ADHD: inattention/cognitive problems, hyperactivity/restlessness, impulsivity/emotional lability, and problems with self-concept. Participants in cohort 1 completed the CAARS-S:L at the beginning and end of the semester. The CAARS-S:L has adequate internal consistency (α > .86) and test-retest reliability (r = .89) (Erhardt, Epstein, Conners, Parker, & Sitarenios, 1999). The CAARS correctly classified 85% of a sample containing individuals with and without an ADHD diagnosis, and the adults with ADHD scored significantly higher on the subscales relative to the control group without ADHD, which supports the discriminant validity of the CAARS. There are significant correlations, ranging from r = .37 to r = .67, between childhood reports of ADHD on the *Wender Utah Rating Scale* (Ward, Wender, & Reimherr, 1993) and the CAARS as well as moderate to high correlations between the CAARS and observer ratings of current ADHD symptomology, which supports the construct validity of this measure.

Demographics questionnaire. Participants were asked to fill out a brief demographics form during the intake appointment which included information about participants' age, date of birth, race, and ADHD medication use and also included information about major or intended major, living arrangements (on or off-campus and number of roommates), and relationship status for participants in cohorts 2 and 3. All participants were asked to report on any medication changes and additional services received at the end of the semester.

Treatment Procedures

Participants who met inclusion criteria for the study were randomly assigned to either the coaching treatment condition or the control condition. All participants continued to access DSS services throughout the course of this study. At the end of the semester, all students met with the researcher individually to complete the post-treatment assessment measures.

Coaching treatment cohort 1. During the pilot phase of the study, the 10 participants randomly assigned to the coaching treatment condition received face-to-face coaching sessions approximately once every two weeks. The principal investigator served as the coach for all participants. There was a target of six sessions for each participant, and students attended an average of 5.8 sessions (*range* = 4 to 7). Initially, the researcher worked to identify each student's main concerns and identified a specific skill to target (organization, assignment tracking/time management, note taking, or study skills). All 10 participants chose to work on time management. In addition to focusing on time management, two students worked on organizing school materials, two worked on study strategies, and three students worked on note-taking strategies. Interventions in these areas were adapted from three sources: (a) the *Challenging Horizons Program* (CHP; Schultz & Evans, 2015); (b) the *CBT Treatment for Adults with ADHD* treatment manual (Solanto, 2011); and (c) *ADHD Coaching: A guide for Mental Health Professionals* (Prevatt & Levrini, 2015). These sources are described in more detail below.

Coaching treatment cohorts 2 and 3. Participants in cohorts 2 and 3 who were randomly assigned to the coaching treatment condition were then randomly assigned to a coach. Six graduate students in the school psychology program at ECU volunteered to be coaches. Four coaches were doctoral level students and two coaches were master's level students. Each coach

was assigned to work with up to two participants per semester, and each coach worked with the same participant throughout the semester. Coaching consisted of individual, biweekly meetings, and the sessions were designed to last 20 to 30 minutes. The coaching intervention focused on guiding participants to develop and implement new time management/assignment tracking strategies, and participants had the option to target organization, note-taking, or study strategies as well. The treatment manual developed for this study is included as Appendix B. The treatment is designed to be delivered in six sessions and consists of the following sessions: (1) Goal Setting and Introduction to Time Management, (2) Planner Set-up, (3-5) Time Management Follow-Up, and (6) Future Planning. Supplemental sessions are included in the manual for organization, note-taking, and study skills. The treatment manual describes how to add in supplemental content when indicated. Students in cohorts 2 and 3 attended an average of 4.9 sessions (*range* = 0 to 6). One student received supplemental note-taking sessions, and four students received supplemental study skills sessions.

Treatment development. The *Challenging Horizons Program* (CHP; Schultz & Evans, 2015), the *CBT Treatment for Adults with ADHD* treatment manual (Solanto, 2011), and *ADHD Coaching: A guide for Mental Health Professionals* (Prevatt & Levrini, 2015) informed the coaching treatment received by participants in cohort 1 as well as the development of the coaching treatment package received by participants in cohorts 2 and 3. The CHP is a school-based consultation program designed to target secondary school students' organization, note-taking, study skills, assignment tracking, and challenging behaviors (Schultz & Evans, 2015). Previous research has found that the interventions used in the CHP are feasible, acceptable, and age-appropriate. Additionally, moderate improvements in parent ratings of students' academic impairment, inattention, family functioning, and peer relationships have been found among high

school students who participated in the CHP (Evans, Schultz, & DeMars, 2014). The techniques used in the CHP to teach adolescents assignment tracking strategies and to monitor student progress on assignment tracking informed the development of the time management sessions for this study. Additionally, the CHP techniques for teaching and monitoring organization, note-taking, and study skills informed the development of the optional supplemental sessions.

Solanto's (2011) treatment manual is a CBT intervention developed for adults with ADHD. The manual includes specific behavioral strategies for improving time management, organization, and planning as well as techniques for targeting maladaptive cognitions among adults with ADHD. The recommendations provided by Solanto (2011) regarding time management and planner use informed the Planner Set-Up session included in the coaching treatment manual developed for this study. Finally, the goal setting material and the problem solving model (identify an issue, brainstorm solutions, discuss pros/cons, select a solution, discuss barriers, and evaluate progress) that are infused in each session in treatment package developed for this study were adapted from the coaching guide by Prevatt & Levrini (2015).

Coach training and treatment adherence. The researcher trained the coaches who implemented the coaching treatment for participants in cohorts 2 and 3 at the beginning of the fall 2017 semester, before they implemented the coaching treatment package. Coaches were provided with a copy of the treatment manual to review and participated in a 3-hour workshop at the beginning of the semester. During the workshop, the researcher provided direct instruction about the coaching treatment, and coaches engaged in role-play activities. Treatment adherence during the training role-plays and during study implementation was assessed via a self-report yes/no checklist that contains the required procedures for each session as described in the treatment manual (see Appendix C). Each session listed in the manual has its own corresponding

adherence checklist. During coach training, the researcher rated coaches' adherence using the appropriate adherence checklist. Adherence issues were corrected following the role-play, and additional role-plays occurred as necessary until adherence rates ≥90% were achieved. Coaches also had to score an 80% or higher on a competency questionnaire administered at the end of the workshop to ensure their understanding of intervention procedures.

During actual session implementation with study participants, all coaches completed the appropriate adherence checklist immediately following each coaching session delivered. Coaches were 98% adherent on average per coach self-report (*range* = 66 to 100). The researcher directly observed one coaching session for each graduate student coach during both the fall and spring semester to monitor treatment adherence. The researcher completed an adherence checklist during observed sessions. The researcher provided coaches will feedback immediately after observed sessions and corrected any adherence issues. The average observed adherence rating was 97% (*range* = 83 to 100). The researcher met with coaches on a biweekly basis to help with case management and to review the adherence measures. The dissertation chair was also available to provide supervision to all coaches throughout the duration of the study, but this resource was never utilized.

Control condition. Students in the control condition were sent six newsletters total, and newsletters were distributed once every two weeks. During the pilot phase of the study, the researcher emailed participants a PDF of each newsletter. For cohorts 2 and 3, the researcher emailed participants a link to each newsletter, which was posted on a website. The website was connected to Google Analytics to aide in tracking newsletter views. The newsletters contained brief tips and strategies on goal setting, time management, note-taking, and organization along with one psychoeducational newsletter regarding ADHD. The newsletters were intended to keep

participants in the control group connected with the study over the course of one semester and provided participants with information that was being covered in coaching. Participants in the coaching condition in cohorts 2 and 3 were also given access to the newsletters throughout the duration of the study.

There were 23 users who viewed the website among students in the control condition in cohort 2, and 12 users who viewed the website among the control condition in cohort 3. There were 12 users who viewed the website among students in the treatment condition in cohort 2 and 15 users who viewed the website among the treatment condition in cohort 3. Of note, these data are imperfect measures of newsletter interactions as the number of users exceeded the number of participants enrolled in each condition. This likely occurred because participants used different devices to access different newsletters, which resulted in a "new user" being identified. Participants in cohorts 2 and 3 also self-reported the number of newsletters viewed. Participants in the control condition viewed 4 newsletters on average (SD = 1.85) and participants in the treatment condition viewed 2 newsletters on average (SD = 1.38).

Design and Data Analysis

This study used an experimental design with random assignment of participants to the treatment and control conditions and employed quantitative analyses to test the hypotheses. First, to examine the success of randomization and to evaluate whether the treatment and control groups were equivalent at pretest, a series of independent samples *t*-tests were conducted on all continuous pretest measures and chi-square analyses were conducted on categorical variables. To assess the acceptability of and participants' satisfaction with the intervention procedures, independent samples *t*-tests were conducted comparing total scores on the BIRS, the *Treatment Satisfaction Survey,* and the ACBS between conditions.

To examine the efficacy of the coaching treatment, I conducted a series of regression analyses to determine whether treatment status was a significant predictor of GPA, the global executive composite and the metacognition index from the BRIEF-A; the time management, organization, study skills, and note taking subscales from the SMALSI; and the ADHD total scores from the BAARS-IV and the ADHD symptom index from the CAARS. The posttest score for each outcome was the dependent variable in the respective regression analysis, and the corresponding pretest score, cohort status (pilot vs. larger-scale phase), and treatment status (treatment vs. control) served as the predictor variables. I focused on interpreting the effect sizes associated with treatment status in each regression analysis. The squared semi-partial correlation coefficient was calculated as the effect size measure. The squared semi-partial correlation coefficient represents the variance in a dependent variable that is explained by a predictor variable after controlling for the effects of other variables included the analysis on the predictor variable (Wuensch, 2017). The semi-partial correlation coefficient can be interpreted according to Cohen's benchmarks; .01 = small effect, .09 = medium effect, .25 = large effect (Cohen, 1988).

A series of moderation analyses were conducted to determine the degree to which anxiety influenced treatment outcomes (Hayes, 2017). The dependent variables in the moderation analyses were posttest scores for GPA, global executive composite, metacognition index, time management, organization, note-taking, study skills, and total ADHD symptoms. The corresponding pretest score as well as treatment status, cohort status, BAI raw score, and the interaction between treatment status and BAI raw score served as the predictor variables in each moderation analysis. First, I examined the *p*-value associated with the interaction terms in each moderation analysis. A significant interaction indicates that the simple slopes are significantly

different from each other. I explored all interactions through an analysis of simple slopes in order to examine the conditional effects of treatment status at minimal, mild, moderate, and severe levels of anxiety based on the clinical cutoffs on the BAI.

Missing data. There were 8 participants (13.56%) with missing data, with 2.59% of values included in statistical analyses missing across measures completed by all 3 cohorts. Specifically, data were missing for pretest GPA (n = 4), posttest GPA (n = 1), BIRS (n = 2), *Treatment Satisfaction Survey* (n = 2), posttest BRIEF-A indices (n = 4), and posttest SMALSI indices (n = 3). Data were primarily missing due to attrition. Item nonresponse and year in school, specifically freshmen not having a pretest GPA, also led to missing values. Multiple imputation with the Markov chain Monte Carlo (MCMC) method was used to estimate missing values using the full dataset under the assumption that data were missing at random. Twenty datasets in which missing values were replaced with imputed values were generated, based on recommendations by Graham, Olchowski, and Gilreath (2007). The statistical results reported are values that were pooled across analyses run on each imputed dataset. For the ABCS and the BAARS IV, which were only completed by participants in cohorts 2 and 3 (n = 39), data were missing for 10.26% of cases. Specifically, data were missing due to attrition for four participants for BAARS-IV posttest scores and two participants for the ABCS. Multiple imputation with the MCMC method was conducted using the dataset containing the 39 participants in cohort 2 and 3. Twenty datasets in which missing values were replaced with imputed values were generated, and the statistical values reported were obtained by pooling the results of analyses across the imputed datasets.

Power Analysis

An a priori power analysis using the statistical software G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009) was conducted to determine sample size requirements for an adequately powered clinical trial using the observed model effect sizes (f^2) from the moderation analyses conducted in a pilot randomized controlled trial (Kininger et al., 2016). All estimates assume two-tail tests, three predictors, and $\alpha = .05$. Results from the power analysis are presented in Table 3.

Table 3

Sample Sizes Required for Adequate Statistical Power

Outcome	Observed R^2	f^2	80% Power	90% Power
SMALSI: Time Management	.235	.307	28	37
BRIEF-A: Metacognition Index	.176	.214	39	52
GPA	.151	.178	47	62
SMALSI: Organization	.115	.130	63	83
BRIEF-A: Global Executive Composite	.107	.120	68	90
CAARS-S:L: Total ADHD symptoms	.061	.064	123	164

Note. Outcome: SMALSI = *School Motivation and Learning Strategies Inventory*; BRIEF-A = *Behavior Rating Inventory of Executive Functioning, Adult Version*; GPA = grade point average; CAARS-S:L = *Conners' Adult ADHD Rating Scale, Self-Report, Long Version*

Based on the results of the power analysis, the target sample size for this study was 50 as this sample size would allow for 80% power in the moderation analyses examining the conditional effects of anxiety on time management, metacognition, and GPA.

CHAPTER III: RESULTS

This chapter presents the results of all planned statistical analyses. The statistical software package *IMB Statistical Package for the Social Sciences* (SPSS) version 25 was used to conduct all quantitative analyses. All relevant statistical analyses are reported in the order of the research questions, with initial data screening results for each analysis presented first. Table 4 presents an overview of the means and standard deviations for all outcome measures, and Table 5 presents the correlation matrix for all outcome measures.

Acceptability and Satisfaction

Acceptability. An independent samples *t*-test was conducted to examine whether there were significant differences in the total score on the BIRS between treatment and control conditions. Visual inspection of boxplots for the treatment and control conditions did not reveal any significant outliers. The Kolmogorov-Smirnov test of normality indicated that the distribution for the BIRS total score was not significantly different from normal for the control condition ($D[27] = .13$, $p = .200$), but was significantly different from normal for the treatment condition ($D[30] = .17$, $p = .022$). Visual inspection of the histogram for the treatment condition revealed a cluster of eight scores falling at the highest end of the scale. These values were not extreme enough, however, to be considered outliers relative to the rest of the distribution. The normal q-q plot for the treatment condition provided evidence of skewness. According to the procedure recommended by Field (2018), skewness and kurtosis values were transformed into *z*-scores. All *z*-scores fell below 1.96, suggesting no significant skew or kurtosis in the data. Overall, the distribution of scores was consistent with expectations, suggesting that there were no usual cases or data entry errors.

Table 4

Means and Standard Deviations for Outcome Measures

	Pretest				Posttest			
	Treatment		Control		Treatment		Control	
Variable	*M*	(*SD*)	*M*	(*SD*)	*M*	(*SD*)	*M*	(*SD*)
BAI	8.83	(7.58)	9.66	(7.78)				
BIRS					67.60	(6.02)	57.81	(10.23)
							58.19	
Satisfaction					22.07	(2.27)	18.78	(3.99)
							18.91	
ABCS					44.20	(7.32)	42.06	(7.92)
							42.19	
GPA	2.78	(0.93)	2.89	(0.81)	3.05	(0.67)	2.80	(0.88)
	2.79		*2.88*				*2.80*	
BRIEF-A								
Metacognition Index	81.03	(11.29)	82.48	(12.25)	76.50	(15.69)	78.56	(16.06)
							78.46	
Global Executive Composite	132.03	(17.12)	136.17	(18.62)	126.77	(24.69)	130.84	(26.87)
							130.46	
SMALSI								
Time Management	18.57	(7.69)	16.21	(6.42)	23.60	(7.83)	19.69	(8.97)
							19.91	
Organization	18.87	(7.80)	17.66	(6.75)	22.17	(7.28)	20.31	(7.06)
							20.39	
Note-Taking	24.10	(6.93)	22.86	(8.25)	28.00	(7.94)	25.69	(10.25)
							25.77	
Study Skills	28.50	(6.72)	25.62	(7.69)	30.80	(7.36)	29.42	(7.33)
							29.45	
BAARS-IV								
ADHD Total Symptoms	39.20	(6.85)	43.05	(6.33)	41.05	(9.45)	42.13	(6.60)
							41.97	
CAARS								
ADHD Total Symptoms	25.30	(12.06)	26.70	(10.40)	21.10	(9.52)	25.70	(11.26)

Note: BAI = Beck Anxiety Inventory; BIRS = behavior intervention rating scale; ABCS = ADHD benefits of coaching scale; BRIEF-A = behavior rating inventory of executive functioning—adult version; SMALSI = school motivation and learning strategies inventory; BAARS-IV = Barkley adult ADHD rating scale; CAARS = Conners' adult ADHD rating scale.

Pooled means are reported in *italics* for variables in which multiple imputation was used and appear underneath means for the original dataset in which missing values were excluded.

Clinically significant raw score values are as follows: Metacognition Index: ≥ 73; Global Executive Composite ≥ 126; Time management: ≤ 17; Organization ≤ 16; Note-taking: ≤ 20; Study skills: ≤ 21; BAARS IV ADHD total symptoms: ≥ 39; CAARS ADHD total symptoms: ≥ 24 for women; ≥ 19 for men.

Table 5

Correlation Matrix

Variable	Pre GPA	Pre GEC	Pre MI	Pre Org	Pre Time	Pre Note	Pre Study	Pre BAARS	Pre CAARS	BIRS	SAT
Pre GEC	-.234										
Pre MI	-.247	.889**									
Pre Org	.218	-.514**	-.652**								
Pre Time	.249	-.478**	-.558**	..705**							
Pre Note	-.004	-.309*	-.330*	.559**	.536**						
Pre Study	.156	-.271*	-.295*	.571**	.658**	.608**					
Pre BAARS	-.214	.556**	.521**	-.168	-.136	-.269	-.002				
Pre CAARS	.035	.765**	.745**	-.281	-.439	-.192	-.167	N/A			
BIRS	-.178	-.074	-.008	.051	.068	.002	-.032	-.077	-.039		
SAT	-.154	-.143	-.117	.209	.264*	.195	.218	.000	-.173	.842**	
ABCS	-.076	-.335*	-.413**	.546**	.680**	.293	.381*	-.075	N/A	.372*	.430**

Variable	Post GPA	Post GEC	Post MI	Post Org	Post Time	Post Note	Post Study	Post BAARS	Post CAARS	BAI
Pre GPA	.430**	.069	.066	.018	.032	-.079	.055	.143	.102	.054
Pre GEC	-.376**	.702**	.669**	-.447**	-.511**	-.276*	-.338**	.518**	.607**	.173
Pre MI	-.352**	.597**	.676**	-.548**	-.467**	-.264*	-.334**	.466**	549*	.007
Pre Org	.182	-.305*	-.421**	.780**	.590**	.447**	.466**	-.132	-.217	.099
Pre Time	.257	-.300*	-.404**	.651**	.769**	.520**	.636**	.028	-.438	.137
Pre Note	.014	-.142	-.198	.495**	.427**	.648**	.503**	-.045	-.351	.332**
Pre Study	.049	-.128	-.176	.407**	.438**	.408**	.565**	.080	-.181	.182
Pre BAARS	-.235	.281	.271	-.189	-.130	-.073	-.123	.519**	.N/A	-.025
Pre CAARS	-.292	.554*	.554*	-.104	-.302	-.141	-.159	N/A	.732**	-.064
BIRS	.095	-.263*	-.266*	.326*	.269*	.240	.263*	-.047	-.274	-.196
SAT	.092	-.263*	-.324*	.463**	.441**	.356**	.459**	-.009	-.504*	-.227
ABCS	.223	-.462**	-.557**	.809**	.824**	.633**	.701**	-.016	N/A	.027

Variable	Post GPA	Post GEC	Post MI	Post Org	Post Time	Post Note	Post Study	Post BAARS	Post CAARS
Post GEC	-.290*								
Post MI	-.292*	.947**							
Post Org	.221	-.538**	-.640**						
Post Time	.324*	-.550**	-.603**	.733**					
Post Note	.213	-.437**	-.480**	.631**	.716**				
Post Study	.282*	-.433**	-.493**	.657**	.756**	.776**			
Post BAARS	-.011	.649**	.625**	-.218	-.145	-.022	-.013		
Post CAARS	-.375	.801**	.816**	-.392	-.541*	-.488*	-.529*	N/A	
BAI	.003	.234	.171	.023	-.075	.180	.106	.167	.018

Note: GEC = global executive composite; MI = metacognition index; Org = organization; Time = time management; Note = note taking; Study = study skills; BAARS = Barkley Adult ADHD Rating Scale; CAARS = Conners Adult ADHD rating scale; BIRS = behavior intervention rating scale; SAT = satisfaction; ABCS = ADHD benefits of coaching scale; BAI = Back Anxiety Inventory

* $p < .05$; ** $p < .01$.

Examination of Levene's test indicated that the assumption of homogeneity of error variances was not met (F[1,55] = 5.56, p = .022). Thus, the result of the pooled t-test when equal variances are not assumed is reported. Participants in the treatment condition reported significantly greater acceptability of the coaching intervention (M = 67.60) relative to participants in the control condition rating the acceptability of the newsletters (M = 58.19), t(418576.9) = -4.35, p < .001, d = 1.12.

Satisfaction. To examine participant satisfaction with the intervention, an independent samples t-test was conducted to compare differences in total scores on the *Treatment Satisfaction Survey* between treatment and control conditions. Visual inspection of boxplots for the treatment and control conditions did not reveal any significant outliers, and visual inspection of histograms and normal q-q plots indicated that the data were normally distributed for treatment and control conditions. Of note, there were a cluster of seven scores falling at the highest end of the scale in the treatment condition. These values were not extreme enough, however, to be considered outliers relative to the rest of the distribution. The Kolmogorov-Smirnov test of normality indicated that the distribution for the *Treatment Satisfaction Survey* total score was not significantly different from normal for the treatment (D[30] = .147, p = .096) or control conditions (D[27] = .123 p = .200). Taken together, these results suggest the data were entered correctly and no unusual cases were present. Levene's test indicated that the assumption of homogeneity of error variances was not met (F[1,55] = 8.42, p = .005). Thus, the result of the pooled t-test when equal variances are not assumed is reported. Participants in the treatment condition reported significantly greater satisfaction with the coaching intervention (M = 22.07) relative to participants in the control condition rating their satisfaction with the newsletters (M = 18.91), t(45412.1) = -3.74, p < .001, d = .97

Perceived benefits. An independent samples *t*-test was conducted to compare differences in total scores on the ABCS total score between treatment and control conditions. Participants in cohorts 2 and 3 completed the ABCS. Thus, the sample for this analysis was comprised of 20 participants in the treatment condition and 19 students in the control condition. Visual inspection of boxplots for the treatment and control conditions did not reveal any significant outliers. *Z*-scores for skewness and kurtosis values fell below 1.96, suggesting no significant skew or kurtosis in these data. The Kolmogorov-Smirnov test of normality indicated that the distribution for the ABCS total score was not significantly different from normal for the treatment condition (D[20] = .07, p = .200) or control condition (D[17] = .17, p = .200). Taken together, these results suggest the data were entered correctly and no unusual cases were present. Levene's test indicated that the assumption of homogeneity of error variances was met (F[1,35] = .30, p = .586). Participants in the treatment (M = 44.20) and control conditions (M = 42.19) reported similar levels of perceived benefits of the intervention received, t(35) = -.84, p = .399, d = .27.

Efficacy

Prior to conducting each regression analysis, the data were first examined for outliers and influential cases through analysis of standardized residuals, Cook's distance values, and Mahalanobis distance values. Next, assumptions of linearity, homoscedasticity, and normality of residuals were examined through visual inspection of residual plots. The Durbin-Watson statistic was above 1 and below 3, which are conservative minimum and maximum values recommended by Field (2018) in all regression analyses, indicating the assumption of independent errors was met. Variance inflation factor (VIF) and tolerance values were also calculated to assess multicollinearity.

GPA. A multiple regression analysis was conducted to examine whether the coaching intervention resulted in significant changes in GPA. The dependent variable in this analysis was end of semester GPA and the predictor variables were pre-treatment GPA, treatment status, and cohort status. Absolute values of standardized residuals fell below 3.29, Cook's distance values fell below 1, and Mahalanobis distances fell below 11.35, the chi-square critical value at $p = .01$, suggesting there were no unusual or influential cases. Visual inspection of standardized predicted values plotted against standardized residuals indicated that assumptions of homoscedasticity and linearity were met. The Durbin-Watson statistic indicated the assumption of independent errors was met ($d = 2.00$). The VIF values fell below 10 and tolerance values were above 0.1 for the predictor variables, suggesting that multicollinearity was not a significant concern. The histograms and normal p-plots of standardized residuals provided evidence that the residuals were negatively skewed. The average variance in GPA explained by the full model was 22.5%. Pooled regression coefficients are displayed in Table 6. The GPA pretest score was the only predictor with a significant partial effect in the full model ($p = <.001$). According to Cohen's benchmarks, treatment status was associated with a small effect on GPA ($sr^2 = .034$) in the anticipated direction.

Table 6

Regression Coefficients for GPA (N = 59)

	Zero-Order Correlation							
Variable	CS	Pre GPA	Post GPA	*b*	95% CI		sr^2	*p*
Treatment Status	.012	-.052	.162	.287	-.078	.652	.034	.124
Cohort Status		-.106	-.119	-.123	-.508	.262	.006	.530
Pretest GPA			.430*	.391	.176	.606	.184	<.001
							Intercept = 1.755	
Mean		2.832	2.925					

Note: CS = cohort status
* p < .05

Executive functioning. To investigate whether the coaching intervention led to changes in executive functioning, two multiple regression analyses were conducted. In the first analysis, the Metacognition Index (MI) from the BRIEF-A was the dependent variable, and in the second analysis, the Global Executive Composite (GEC) from the BRIEF-A was the dependent variable. The predictor variables in each analysis were treatment status, cohort status, and the respective pretest score.

For the regression analysis of metacognition, there was no evidence of unusual or influential cases based on examination of standardized residuals, Cook's distances, and Mahalanobis distances. Visual inspection of standardized predicted values plotted against standardized residuals indicated that assumptions of homoscedasticity and linearity were met. The assumption of independence of errors was met (d = 2.17). The histograms and normal p-plots of standardized residuals provided evidence that residuals were roughly normally distributed. The VIF and tolerance values suggested that multicollinearity was not a significant concern. The variance in MI explained by the full model was 47.0% on average. Pooled regression coefficients are displayed in Table 7. The MI pretest score was the only predictor with a significant partial effect in the full model ($p < .001$). Treatment status was associated with negligible effect size ($sr^2 = .0004$) in the anticipated direction.

Table 7

Regression Coefficients for MI

	Zero-Order Correlation							
Variable	CS	Pre MI	Post MI	*b*	95% CI		sr^2	*p*
Treatment Status	.012	-.063	-.065	-.604	-6.453	5.246	.0004	.840
Cohort Status		.160	-.004	-3.674	-9.905	2.557	.013	.248
Pretest MI			.676*	.903	.648	1.158	.466	<.001
						Intercept = 6.357		
Mean		81.75	77.46					

Note: CS = cohort status; MI = metacognition index
* $p < .05$

For the regression analysis of global executive functioning (GEC), there was no evidence of unusual or influential cases through examination of standardized residuals, Cook's distances, and Mahalanobis distances. Visual inspection of the standardized residual scatterplot indicated that assumptions of homoscedasticity and linearity were met, and the histogram and normal p-plot of standardized residuals suggested that residuals were normally distributed. The assumption of independence of errors was met ($d = 2.20$). Examination of VIF and tolerance values indicated multicollinearity was not a significant concern. The average variance in GEC explained by the full model was 50.1%. Pooled regression coefficients are displayed in Table 8. The GEC pretest score was the only predictor with a significant partial effect in the model ($p < .001$). Treatment status was associated with a negligible effect size ($sr^2 = .0001$) that was not in the anticipated direction.

Table 8

Regression Coefficients for GEC (N = 59)

	Zero-Order Correlation							
Variable	CS	Pre GEC	Post GEC	*b*	95% CI		sr^2	*p*
Treatment Status	.012	-.117	-.076	.433	-8.784	9.651	.0001	.927
Cohort Status		.102	-.015	-4.539	-14.249	5.171	.008	.360
Pretest GEC			.702*	.985	.723	1.247	.496	<.001
					Intercept = -.713			
Mean		134.07	128.58					

Note: CS = cohort status; GEC = global executive composite
* $p < .05$

Learning and study strategies. To examine whether the coaching intervention led to changes in learning and study strategies, a series of regression analyses were conducted using the posttest scores on the time management, organization, note-taking, and study skills indices from the SMALSI. The predictor variables in each analysis were treatment status, cohort status, and the respective pretest score.

Data screening for the regression analysis of time management indicated that there were no unusual or influential cases. Visual inspection of standardized residual scatterplots indicated that assumptions of homoscedasticity and linearity were met, and the histograms and normal p-plots of standardized residuals suggested that residuals were normally distributed. The assumption of independence of errors was met ($d = 1.80$). Examination of VIF and tolerance values indicated multicollinearity was not a significant concern. The average variance in time management explained by the full model was 60.7%. Pooled regression coefficients are displayed in Table 9. The time management pretest score was the only predictor with a significant partial effect in the model ($p < .001$). Treatment status was associated with negligible effect on time management ($sr^2 = .009$) in the anticipated direction.

Table 9

Regression Coefficients for Time Management (N = 59)

	Zero-Order Correlation							
Variable	CS	Pre Time	Post Time	*b*	95% CI		sr^2	*p*
Treatment Status	.012	.167	.224*	1.592	-1.208	4.391	.009	.265
Cohort Status		-.050	.042	1.372	-1.534	4.278	.006	.355
Pretest Time Manage			.769*	.884	.687	1.081	.555	<.001
						Intercept = 4.679		
Mean		17.41	21.78					

Note: CS = cohort status; Time = Time Management
* $p < .05$

For the regression analysis of organization, there was no evidence of unusual or influential cases through examination of standardized residuals, Cook's distances, and Mahalanobis distances. Visual inspection of the standardized residual scatterplot indicated that assumptions of homoscedasticity and linearity were met, and examination of VIF and tolerance values indicated multicollinearity was not a significant concern. The assumption of independence of errors was met ($d = 2.07$). The histograms and normal p-plots of standardized residuals suggested that residuals were roughly normally distributed. The variance in organization explained by the full model was 61.6%. Pooled regression coefficients are displayed in Table 10. The organization pretest score was the only predictor with a significant partial effect in the model ($p < .001$). Treatment status was associated with negligible effect on organization ($sr^2 = .004$) in the anticipated direction.

Table 10

Regression Coefficients for Organization (N = 59)

	Zero-Order Correlation							
Variable	CS	Pre Org	Post Org	*b*	95% CI		sr^2	*p*
Treatment Status	.012	.084	.128	.887	-1.436	3.210	.004	.454
Cohort Status		-.122	-.150	-.836	-3.280	1.608	.003	.503
Pretest Org			.780*	.742	.581	.902	.576	<.001
						Intercept = 7.845		
Mean		18.27	21.29					

Note: CS = cohort status; Org = organization
* $p < .05$

For the regression analysis of note-taking skills, there were no unusual of influential cases. Visual inspection of the standardized residual scatterplots indicated that assumptions of homoscedasticity and linearity were met, and the histograms and normal p-plots of standardized residuals suggested that residuals were roughly normally distributed. The assumption of independence of errors was met ($d = 1.76$). Examination of VIF and tolerance values indicated multicollinearity was not a significant concern. The average variance in note-taking explained by the full model was 42.6%. Pooled regression coefficients displayed in Table 11. The note-taking pretest score was the only predictor with a significant partial effect in the model ($p < .001$). Treatment status was associated with a negligible effect on note-taking ($sr^2 = .005$) in the anticipated direction.

Table 11

Regression Coefficients for Note-Taking (N = 59)

	Zero-Order Correlation							
Variable	CS	Pre Note	Post Note	*b*	95% CI		sr^2	*p*
Treatment Status	.012	.082	.127	1.292	-2.260	4.844	.005	.476
Cohort Status		-.077	-.032	.307	-3.433	4.047	.0003	.872
Pretest Note			.648*	.754	.517	.991	.408	<.001
						Intercept = 8.341		
Mean		23.49	26.90					

Note: CS = cohort status; Note = note-taking
* $p < .05$

For the regression analysis of study skills, there was no evidence of unusual or influential cases through examination of standardized residuals, Cook's distances, and Mahalanobis distances. Visual inspection of the standardized residual scatterplots indicated that assumptions of homoscedasticity and linearity were met, and the histograms and normal p-plots of standardized residuals suggested that residuals were normally distributed. The assumption of independence of errors was met ($d = 1.78$). Examination of VIF and tolerance values indicated multicollinearity was not a significant concern. The variance in study skills explained by the full model was 32.2% on average. Pooled regression coefficients are displayed in Table 12. The study skills pretest score was the only predictor with a significant partial effect in the model ($p < .001$). Treatment status was associated with negligible effect size ($sr^2 = .0004$) that was not in the anticipated direction.

Table 12

Regression Coefficients for Study Skills (N = 59)

	Zero-Order Correlation							
Variable	CS	Pre Study	Post Study	*b*	95% CI		sr^2	*p*
Treatment Status	.012	.199	.095	-.300	-3.474	2.875	.0004	.853
Cohort Status		-.274*	-.113	.705	-2.700	4.110	.002	.685
Pretest Study Skills			.565*	.570	.344	.797	.300	<.001
						Intercept = 14.373		
Mean		27.08	30.14					

Note: CS = cohort status; Study = study skills
* $p < .05$

ADHD symptoms. Two regression analyses were conducted in order to analyze changes in ADHD symptoms between treatment and control conditions. The first analysis included participants in cohorts 2 and 3 who completed the BAARS-IV ($n = 39$). The dependent variable used in this analysis was the ADHD total score on the BAARS-IV. The predictors variables were treatment status and pre-test BAARS-IV, ADHD total score. Cook's distance and Mahalanobis' distance values indicated there were no unusual of influential cases. Visual inspection of the standardized residual scatterplots indicated that assumptions of homoscedasticity and linearity were met, and the histograms and normal p-plots of standardized residuals suggested that residuals were roughly normally distributed. The assumption of independence of errors was met ($d = 2.13$). Examination of VIF and tolerance values indicated multicollinearity was not a significant concern. The variance in ADHD total score explained by the full model was 27.9% on average. Regression coefficients are displayed in Table 13. Pretest ADHD total score was the only predictor with a significant partial effect in the model ($p < .001$). Treatment status was associated with negligible effect size ($sr^2 = .009$), but not in the anticipated direction.

Table 13

Regression Coefficients for BAARS-IV Total ADHD Symptoms (N = 39)

	Zero-Order Correlation						
Variable	Pre Sym	Post Sym	*b*	95% CI		sr^2	*p*
Treatment Status	-.287*	-.059	1.52	-2.995	6.036	.009	.509
Pretest ADHD Sym		.519*	.632	..295	.970	.275	<.001
					Intercept = 14.74		
Mean	41.08	41.50					

Note: Sym = total ADHD symptoms
* $p < .05$

The second analysis included participants in cohort 1 who completed the CAARS (N = 20). The total ADHD symptoms raw score on the CAARS was the dependent variable used in this analysis, and the predictors variables were treatment status and pretest CAARS total ADHD symptoms raw score. Cook's distances and Mahalanobis distances indicated there were no unusual of influential cases. Visual inspection of the standardized residual scatterplot indicated that assumptions of homoscedasticity and linearity were met, and the histogram and normal p-plot of standardized residuals suggested that residuals were roughly normally distributed. The assumption of independence of errors was met (d = 1.68). Examination of VIF and tolerance values indicated multicollinearity was not a significant concern. The full model explained 56.7% of the variance in the ADHD symptoms index (F[2,17] = 11.15, $p < .001$). Regression coefficients are displayed in Table 14. The pretest ADHD symptoms index was the only predictor with a significant partial effect in the model ($p < .001$). Treatment status was associated with a small effect on ADHD symptoms (sr^2 = .032) in the anticipated direction.

Table 14

Regression Coefficients for CAARS Total ADHD Symptoms (N = 20)

	Zero-Order Correlation						
Variable	Pre Sym Index	Post Sym Index	*b*	95% CI		sr^2	*p*
Treatment Status	-.065	-.227	-3.644	-10.492	3.204	.032	.277
Pretest Sym Index		.732*	.683	.363	1.002	.516	<.001
					Intercept = 7.475		
Mean	26.00	23.40					
SD	10.98	10.42					

Note: Sym = ADHD symptoms
* $p < .05$

Moderation Analyses

Most participants in this sample reported a minimal level of anxiety (51%) on the BAI, and the average BAI raw score fell within the mild range ($M = 9.24$, $SD = 7.63$). Table 15 displays frequency statistics for anxiety classification. A chi-square analysis indicated no significant differences in anxiety classifications between treatment and control conditions, $\chi^2(3) = 1.47$, $p = .729$.

Table 15

Anxiety Classifications

Anxiety Classification	*N*	%	Treatment	Control
Minimal	30	51	17	13
Mild	19	32	8	11
Moderate	7	12	3	4
Severe	3	5	2	1

A series of moderation analyses were conducted to determine the degree to which anxiety impacted post-treatment GPA, executive functioning, learning and study strategies, and total ADHD symptoms. The predictor variable in each analysis was treatment status, and cohort status along with the respective pretest score were included in the model as covariates. The moderator variable in each analysis was the BAI raw score. The online calculator by Preacher,

Curran, & Bauer (2019) was used to probe interactions. Assumptions of homoscedasticity, linearity, independence of errors, and multicollinearity for linear regression were examined prior to conducting each moderation analysis by running a series of regression analyses with post-treatment scores on GPA, MI, GEC, time management, organization, note-taking, study skills, and total ADHD symptoms as the dependent variable; treatment status, BAI raw score, and the treatment status X BAI raw score interaction as predictor variables; and the respective pre-treatment score and cohort status as covariates. There was no evidence of outliers and influential cases through analysis of standardized residuals, Cook's distance values, and Mahalanobis distance values. Visual examination of residual plots indicated that assumptions of linearity, homoscedasticity, and normality of residuals were met. The Durbin-Watson statistic was above 1 and below 3, which are conservative minimum and maximum values recommended by Field (2018) in all regression analyses, indicating the assumption of independent errors was met. The variance inflation factors were below 10 and tolerance values were above 0.1, suggesting that multicollinearity was not a significant concern.

GPA. A moderation analysis was conducted to determine the influence of anxiety on post-treatment GPA between the treatment and control conditions. The full model explained 26.0% of the variance in GPA on average. The interaction between treatment status and BAI score was not significant (p = .122). Pooled regression coefficients are displayed in Table 16.

Table 16

Model Summary for Predicting GPA (N = 59)

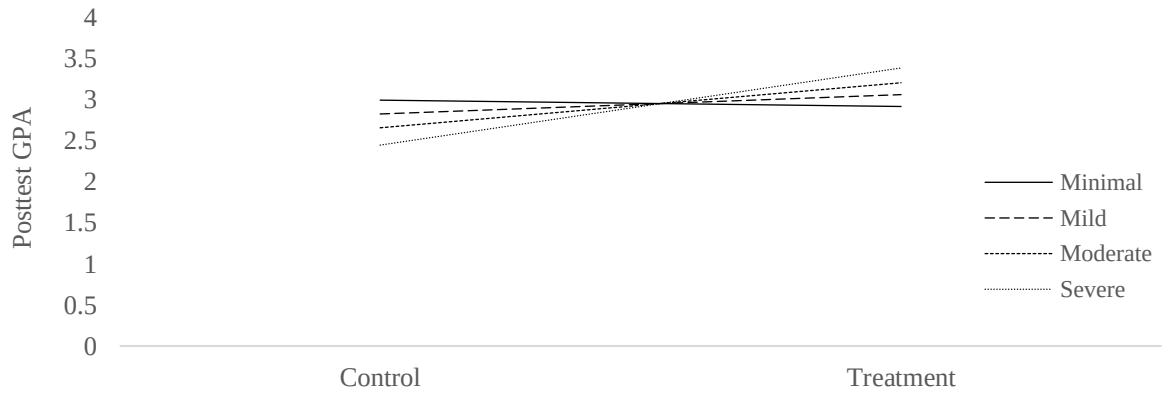
Variable	*b*	95% CI		*SE*	*t*	*p*
Treatment Status	-.077	-.658	.504	.296	-.260	.795
Cohort Status	-.143	-.528	.243	.197	-.726	.468
Pretest GPA	.354	.133	.575	.113	3.137	.002
BAI Raw Score	-.021	-.056	.014	.018	-1.192	.233
Status X BAI	.039	-.010	.088	.025	1.546	.122

Note: BAI = Beck Anxiety Inventory; Status = Treatment Status

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on posttest GPA at clinical cut-off scores on the BAI—minimal (raw score = 0), mild (raw score = 8), moderate (raw score = 16), and severe anxiety (raw score = 26). When anxiety was minimal, there was a nonsignificant, negative relationship between treatment status and post-treatment GPA, b = -.08, $t(53)$ = -.26, p = .80. When anxiety was mild, there was a nonsignificant, positive relationship between treatment status and post-treatment GPA, b =.24, $t(53)$ = 1.29, p = .20. At moderate levels of anxiety, there was a significant, positive relationship between treatment status and post-treatment GPA, b = .55, $t(53)$ = 2.26, p = .02. At severe levels of anxiety, there was a significant, positive relationship between treatment status and post-treatment GPA, b = .94, $t(53)$ = 2.08, p = .04. Figure 2 illustrates the conditional effects and indicates a slight increase in GPA as anxiety level increased among participants in the treatment condition along with a slight decrease in GPA as anxiety level increased among participants in the control condition.

Figure 2

Conditional Effects of Treatment Status on GPA (N = 59)



Executive functioning. A moderation analysis was conducted to determine the influence of anxiety on post-treatment metacognition between the treatment and control conditions. The

full model explained 49.5% of the variance in metacognition on average. The interaction between treatment status and anxiety was not significant (p = .91). Pooled regression coefficients are displayed in Table 17.

Table 17

Model Summary for Predicting MI (N = 59)

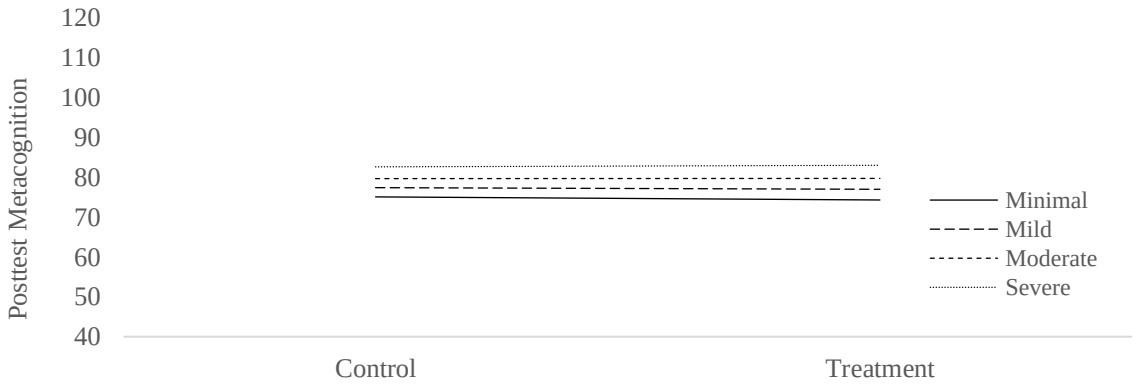
Variable	*b*	95% CI		*SE*	*t*	*p*
Treatment Status	-.770	-9.988	8.448	4.703	-.164	.870
Cohort Status	-3.205	-9.442	3.033	3.183	-1.007	.314
Pretest MI	.901	.645	1.157	.131	6.898	<.001
BAI Raw Score	.289	-.260	.837	.280	1.031	.302
Status X BAI	.045	-.731	.820	.396	.113	.910

Note: MI = metacognition index; BAI = Beck Anxiety Inventory; Status = treatment status

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on posttest metacognition at clinical cut-off scores on the BAI. When anxiety was minimal, there was a nonsignificant, negative relationship between treatment status and post-treatment metacognition, b = -.77, t(53) = -.16, p = .87. When anxiety was mild, there was a nonsignificant, negative relationship between treatment status and post-treatment metacognition, b =-.41, t(53) = -.13, p = .89. At moderate levels of anxiety, the relationship between treatment status and post-treatment metacognition was negative and not significant, b = -.05, t(53) = -.01, p = .89. At severe levels of anxiety, the relationship between treatment status and post-treatment metacognition was positive and nonsignificant, b = .40, t(53) = .05, p = .95. There were no regions of the anxiety raw score in which the regression of post-treatment metacognition on treatment status was significant. Figure 3 illustrates the conditional effects and indicates similar levels of metacognitive impairment between treatment and control conditions, with a slightly higher metacognitive impairment across conditions as anxiety level increases.

Figure 3

Conditional Effects of Treatment Status on MI (N = 59)



A second moderation analysis was conducted to determine the influence of anxiety on post-treatment global executive functioning between the treatment and control conditions. The full model explained 51.4% of the variance in GEC on average. The interaction between treatment status and anxiety was not significant (p = .669). Pooled regression coefficients are displayed in Table 18.

Table 18

Model Summary for Predicting GEC (N = 59)

Variable	*b*	95% CI		*SE*	*t*	*p*
Treatment Status	-1.848	-16.441	12.745	7.446	-.248	.804
Cohort Status	-3.998	-13.834	5.837	5.018	-.797	.426
Pretest GEC	.964	.695	1.233	.137	7.019	<.001
BAI Raw Score	.214	-.671	1.099	.451	.473	.636
Status X BAI	.268	-.961	1.496	.627	.427	.669

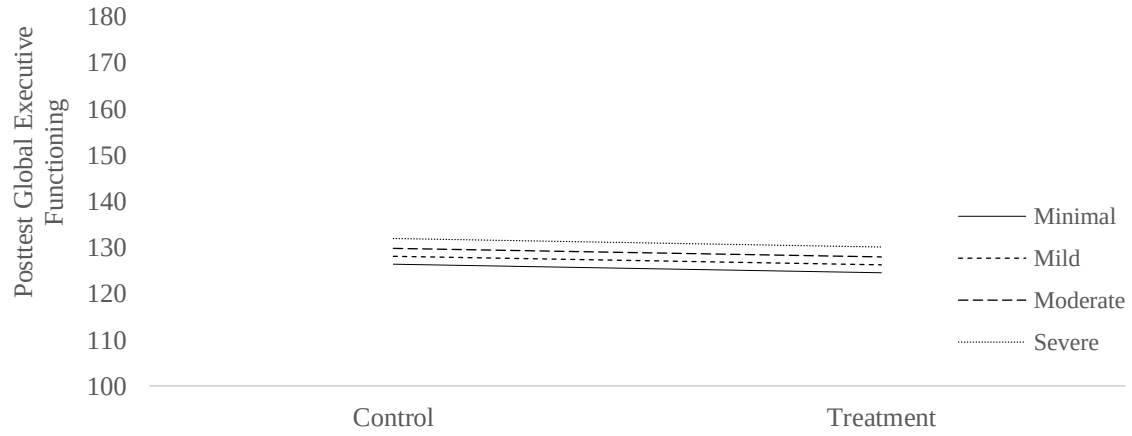
Note: GEC = global executive composite; BAI = Beck Anxiety Inventory; Status = treatment status

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on posttest global executive functioning based on clinical cut-off scores on the BAI. When anxiety was minimal, there was a nonsignificant, negative relationship between treatment status and post-treatment global executive functioning, b = -1.84, $t(53)$ = -.25, p = .80.

When anxiety was mild, there was a nonsignificant, positive relationship between treatment status and post-treatment global executive functioning, b =.30, $t(53)$ = .06, p = .95. At moderate levels of anxiety, the relationship between treatment status and post-treatment global executive functioning was positive and not significant, b = 2.44, $t(53)$ = .38, p = .71. At severe levels of anxiety, the relationship between treatment status and post-treatment global executive functioning was positive and nonsignificant, b = 5.12, $t(53)$ = .44, p = .66. There were no regions of the anxiety raw score in which the regression of post-treatment global executive functioning on treatment status was significant. Figure 4 illustrates the conditional effects. Participants in the treatment condition had similar levels of impairment in global executive functioning, and increasing anxiety was associated with a slight increase in global executive functioning impairment.

Figure 4

Conditional Effects of Treatment Status on GEC (N = 59)



Learning and study strategies. A moderation analysis was conducted to determine the influence of anxiety on post-treatment time management between the treatment and control conditions. The full model explained 63.6% of the variance in time management on average.

The interaction between treatment status and anxiety was not significant (p = .783). Pooled regression coefficients are displayed in Table 19.

Table 19

Model Summary for Predicting Time Management (N = 59)

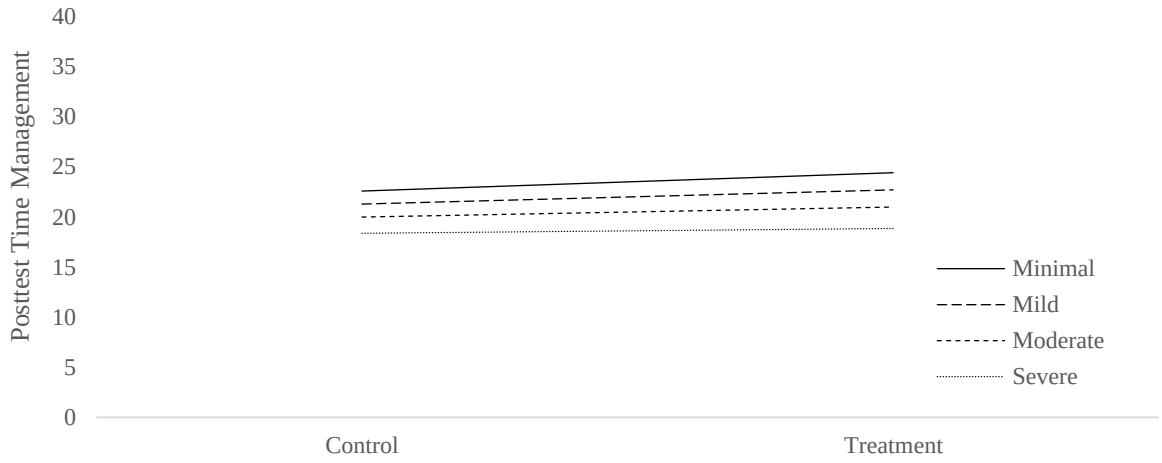
Variable	*b*	95% CI		*SE*	*t*	*p*
Treatment Status	1.832	-2.455	6.120	2.187	.838	.402
Cohort Status	1.127	-1.736	3.990	1.461	.771	.440
Pretest Time	.919	.720	1.119	.102	9.027	<.001
BAI Raw Score	-.162	-.419	.094	.131	-1.240	.215
Status X BAI	-.052	-.419	.316	.187	-.275	.783

Note: Time = time management; BAI = Beck Anxiety Inventory; Status = treatment status

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on posttest time management based on the anxiety score. When anxiety was minimal, there was a nonsignificant, positive relationship between treatment status and post-treatment time management, b = 1.83, $t(53)$ = .84, p = .41. When anxiety was mild, there was a nonsignificant, positive relationship between treatment status and post-treatment time management, b =1.42, $t(53)$ = .98, p = .33. At moderate levels of anxiety, the relationship between treatment status and post-treatment time management was positive and not significant, b = 1.00, $t(53)$ = .51, p = .61. At severe levels of anxiety, the relationship between treatment status and post-treatment time management was positive and nonsignificant, b = .48, $t(53)$ = .14, p = .89. There were no regions of the anxiety raw score in which the regression of post-treatment time management on treatment status was significant. Figure 5 illustrates the conditional effects. Students with minimal anxiety had the highest levels of post-treatment time management. Time management skills slightly decreased as anxiety level increased across both conditions.

Figure 5

Conditional Effects of Treatment Status on Time Management (N = 59)



For the moderation analysis examining the influence of anxiety of posttest organization, the full model explained 62.1% of the variance in organization on average. The interaction between treatment status and anxiety was not significant (p = .714). Pooled regression coefficients are displayed in Table 20.

Table 20

Model Summary for Predicting Organization

Variable	*b*	95% CI		*SE*	*t*	*p*
Treatment Status	.302	-3.409	4.012	1.893	.159	.873
Cohort Status	-.928	-3.415	1.559	1.269	-.731	.465
Pretest Org	.742	.578	.907	.084	8.846	<.001
BAI Raw Score	-.081	-.304	.142	.114	-.712	.477
Status X BAI	.059	-.255	.372	.160	.367	.714

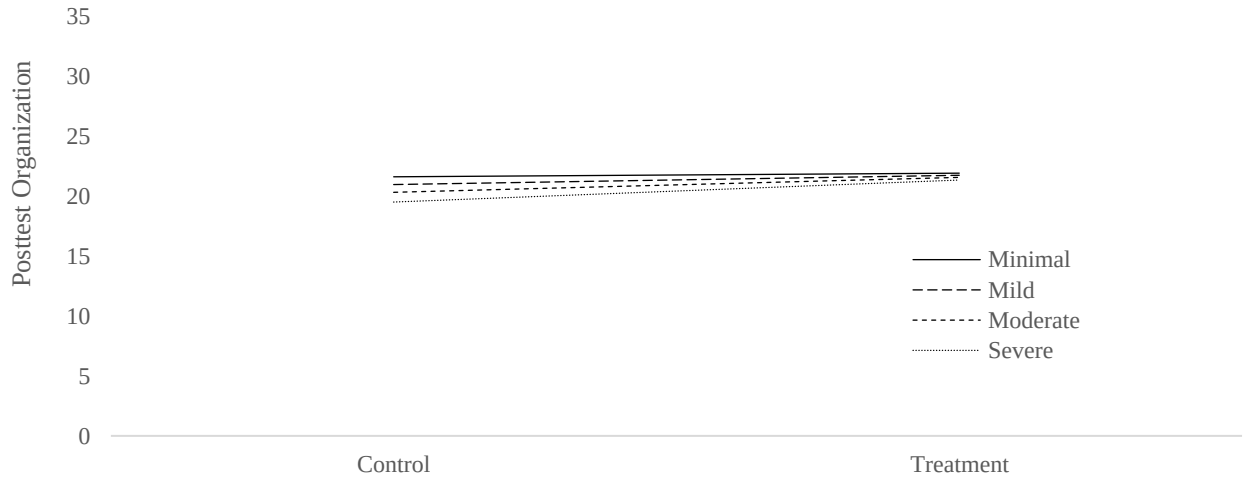
Note: Org = organization; BAI = Beck Anxiety Inventory; Status = treatment status

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on posttest organization based on anxiety classification. When anxiety was minimal, there was a nonsignificant, positive relationship between treatment status and post-treatment organization, b = .30, $t(53)$ = .16, p = .87. When anxiety was mild, there was a

nonsignificant, positive relationship between treatment status and post-treatment organization, b = .77, $t(53)$ = .61, p = .54. At moderate levels of anxiety, the relationship between treatment status and post-treatment organization was positive and not significant, b = 1.25, $t(53)$ = .73, p = .47. At severe levels of anxiety, the relationship between treatment status and post-treatment organization was positive and nonsignificant, b = 1.84, $t(53)$ = .61, p = .54. There were no regions of the anxiety raw score in which the regression of post-treatment organization on treatment status was significant. Figure 6 illustrates the conditional effects. Students in the treatment condition maintained similar levels of post-treatment organization across anxiety levels, whereas students in the control condition exhibited a slight decrease in post-treatment organization as anxiety increased.

Figure 6

Conditional Effects of Treatment Status on Organization (N = 59)



For the moderation analysis examining the influence of anxiety of posttest note-taking, the full model explained 42.8% of the variance in note-taking on average. The interaction between treatment status and anxiety was not significant (p = .854). Pooled regression coefficients are displayed in Table 21.

Table 21

Model Summary for Predicting Note-Taking (N =59)

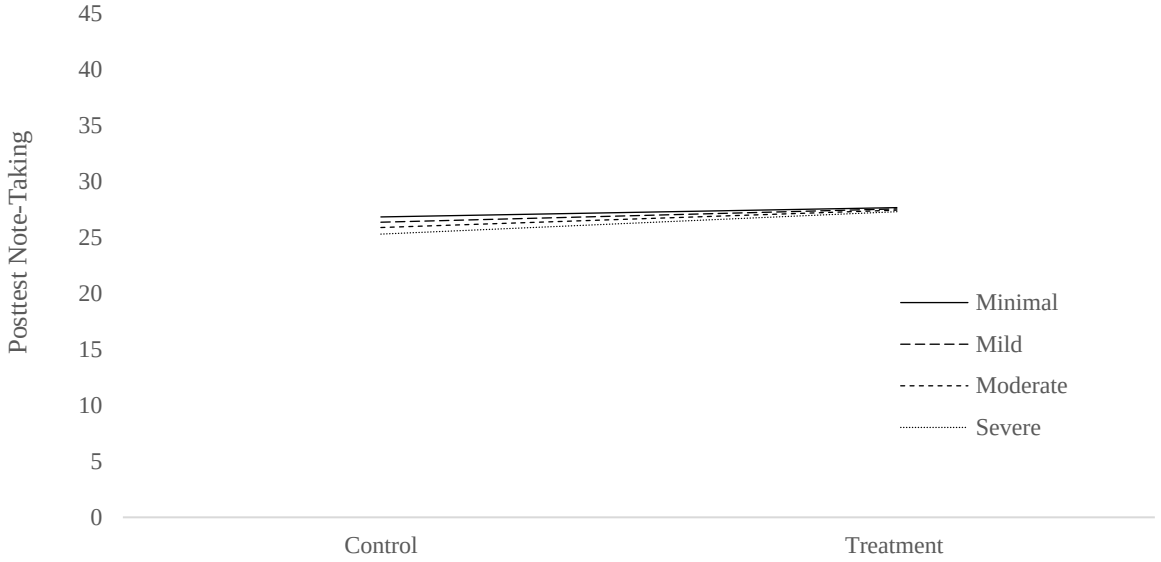
Variable	*b*	95% CI		*SE*	*t*	*p*
Treatment Status	.831	-4.893	6.556	2.921	.285	.776
Cohort Status	.254	-3.562	4.070	1.947	.130	.896
Pretest Note	.765	.509	1.020	.130	5.868	<.001
BAI Raw Score	-.059	-.409	.290	.178	-.332	.740
Status X BAI	.045	-.435	.525	.245	.184	.854

Note: Note = note-taking; BAI = Beck Anxiety Inventory; Status = treatment status

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on posttest note-taking based on clinical cut-off scores on anxiety classification. When anxiety was minimal, there was a nonsignificant, positive relationship between treatment status and post-treatment note-taking, $b = .83$, $t(53) = .28$, $p = .78$. When anxiety was mild, there was a nonsignificant, positive relationship between treatment status and post-treatment note-taking, $b = 1.19$, $t(53) = .62$, $p = .54$. At moderate levels of anxiety, the relationship between treatment status and post-treatment note-taking was positive and nonsignificant, $b = 1.55$, $t(53) = .60$, $p = .55$. At severe levels of anxiety, the relationship between treatment status and post-treatment note-taking was positive and nonsignificant, $b = 2.00$, $t(53) = .44$, $p = .66$. There were no regions of the anxiety raw score in which the regression of post-treatment note-taking on treatment status was significant. Figure 7 illustrates the conditional effects. Among participants in the control condition, increased anxiety was associated with a slight decrease in note-taking. Note-taking remained stable among individuals in the treatment condition across anxiety levels.

Figure 7

Conditional Effects of Treatment Status on Note-Taking (N = 59)



For the moderation analysis examining the influence of anxiety of posttest study skills, the full model explained 32.9% of the variance in study skills on average. The interaction between treatment status and anxiety was not significant (p = .486). Pooled regression coefficients are displayed in Table 22.

Table 22

Model Summary for Predicting Study Skills (N = 59)

Variable	*b*	95% CI		*SE*	*t*	*p*
Treatment Status	-1.646	-6.617	3.325	2.536	-.649	.516
Cohort Status	.617	-2.849	4.083	1.796	.349	.727
Pretest Study Skills	.557	.320	.793	.121	4.611	<.001
BAI Raw Score	-.069	-.368	.230	.153	-.455	.649
Status X BAI	.151	-.273	.574	.216	.697	.486

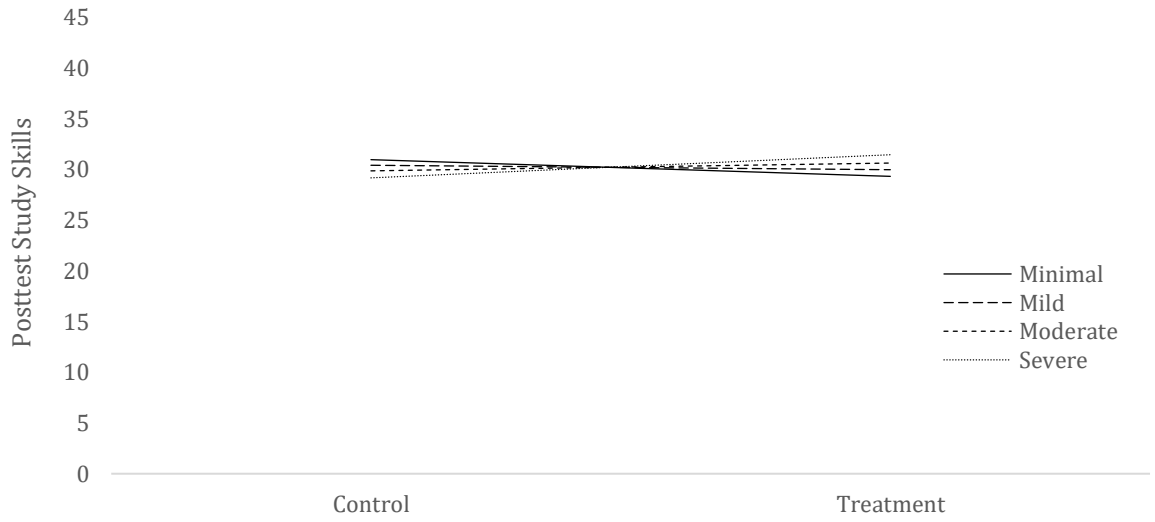
Note: BAI = Beck Anxiety Inventory; Status = treatment status

An analysis of simple slopes was conducted to evaluate the conditional effects of treatment status on posttest study skills based on anxiety classification. When anxiety was minimal, there was a nonsignificant, negative relationship between treatment status and post-

treatment study skills, b = -1.65 t(53) = -65, p = .52. When anxiety was mild, there was a nonsignificant, negative relationship between treatment status and post-treatment study skills, b = -.44, t(53) =-.26, p = .80. At moderate levels of anxiety, the relationship between treatment status and post-treatment study skills was positive and nonsignificant, b = .77, t(53) = .34, p = .74. At severe levels of anxiety, the relationship between treatment status and post-treatment study skills was negative and nonsignificant, b = -2.28, t(53)= .56, p = .58. There were no regions of the anxiety raw score in which the regression of post-treatment study skills on treatment status was significant. Figure 8 illustrates the conditional effects. There was a slight increase in post-treatment study skills as anxiety level increased among participants in the treatment condition and a small decrease in study skills as anxiety level increased among participants in the control condition.

Figure 8

Conditional Effects of Treatment Status on Study Skills (N = 59)



ADHD symptoms. Two moderation analyses were conducted to determine the influence of anxiety on post-treatment ADHD symptoms between the treatment and control conditions. In the first analysis, the sample consisted of participants in cohorts 2 and 3 who completed the

BAARS-IV (n = 39). The BAARS-IV total score was the dependent variable in the analysis. Treatment status was the predictor variable, anxiety raw on the BAI was the moderator, and the pretest BAARS-IV total score was included in the model as a covariate. The full model explained 32.0% of the variance in ADHD symptoms on average. The interaction between treatment status and anxiety was not significant (p = .581). Pooled regression coefficients are displayed in Table 23.

Table 23

Model Summary for Predicting BAARS-IV Total Score (n = 39)

Variable	*b*	95% CI		*SE*	*t*	*p*
Treatment Status	.144	-6.802	7.091	3.544	.041	.968
Pretest ADHD Sym	.645	.307	.983	.172	3.745	<.001
BAI Raw Score	.127	-.276	.530	.206	.617	.537
Status X BAI	.174	-.445	.794	.316	.552	.581

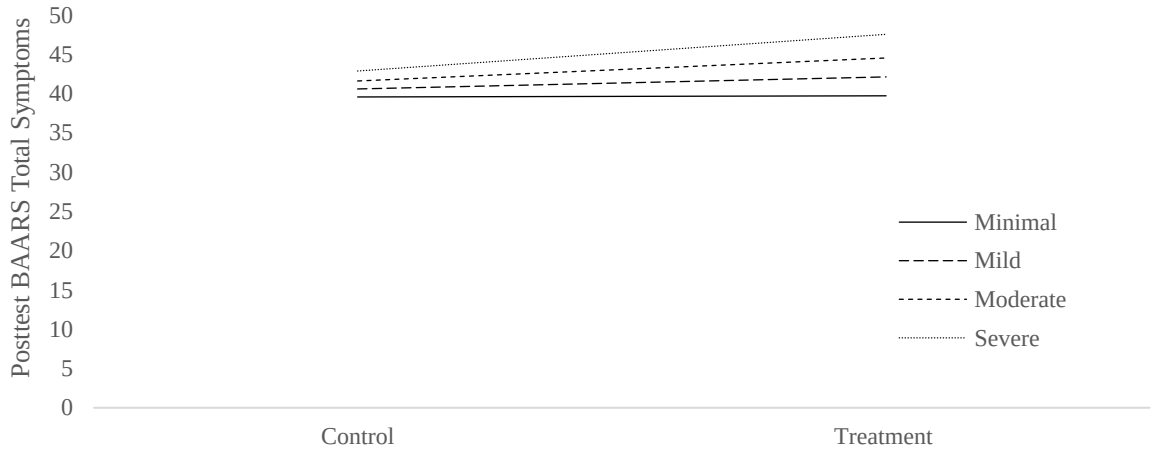
Note: ADHD Sym = BAARS-IV total score; BAI = Beck Anxiety Inventory; Status = treatment status

An analysis of simple slopes was conducted to examine the conditional effects of treatment status on posttest BAARS-IV total ADHD symptoms based on anxiety classification. When anxiety was minimal, there was a nonsignificant, positive relationship between treatment status and post-treatment BAARS-IV total ADHD symptoms, b = .14, t(34) = .04, p = .97. When anxiety was mild, there was a nonsignificant, positive relationship between treatment status and post-treatment BAARS-IV total ADHD symptoms, b = 1.54, t(34) =.64, p = .53. At moderate levels of anxiety, the relationship between treatment status and post-treatment BAARS-IV total ADHD symptoms was positive and nonsignificant, b = 2.93, t(34) = .85, p = .40. At severe levels of anxiety, the relationship between treatment status and post-treatment BAARS-IV total ADHD symptoms was positive and nonsignificant, b = 4.67, t(34) = .77, p = .45. There were no regions of the anxiety raw score in which the regression of post-treatment BAARS-IV total ADHD symptoms on treatment status was significant. Figure 9 illustrates the

conditional effects. Post-treatment total BAARS-IV ADHD symptoms increased slightly among participants in the treatment and control conditions as anxiety level increased, with participants in the treatment condition having slightly higher total ADHD symptoms relative to participants in the control condition.

Figure 9

Conditional Effects of Treatment Status on BAARS-IV Total Score (n = 39)



In the second analysis, the sample consisted of participants in the pilot study who completed the CAARS (n = 20). The CAARS total score was the dependent variable in the analysis, treatment status was the predictor variable, anxiety raw on the BAI was the moderator, and the pretest CAARS total score was included in the model as a covariate. The full model explained 57.2% of the variance in total ADHD symptoms, $F(4,15) = 5.00$, $p = .009$. The interaction between treatment status and anxiety was not significant ($p = .801$). Regression coefficients are displayed in Table 24.

Table 24

Model Summary for Predicting CAARS Total Score (n = 20)

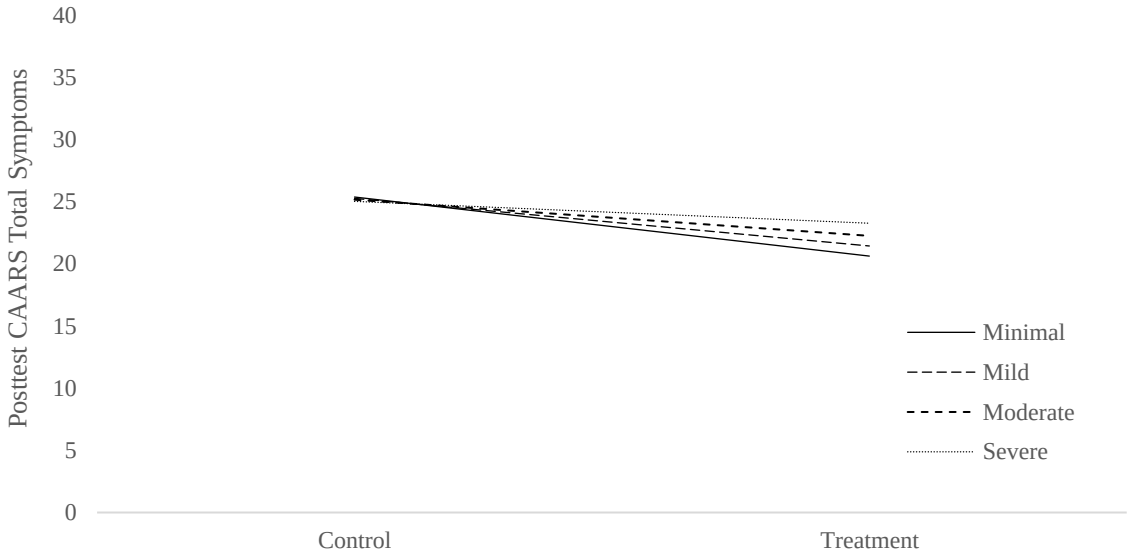
Variable	*b*	95% CI		*SE*	*t*	*p*
Treatment Status	-4.749	-17.128	7.630	5.808	-.818	.426
Pretest ADHD Sym	.689	.345	1.033	.162	4.267	.001
BAI Raw Score	-.014	-1.153	1.587	.359	-.038	.971
Status X BAI	.115	-1.069	.839	.448	.257	.801

Note: ADHD Sym = CAARS total score; BAI = Beck Anxiety Inventory; Status = treatment status

An analysis of simple slopes was conducted to examine the conditional effects of treatment status on posttest CAARS total symptoms based on anxiety classification. When anxiety was minimal, there was a nonsignificant, negative relationship between treatment status and post-treatment CAARS total symptoms, b = -4.75 $t(15)$ = -.82, p = .42. When anxiety was mild, there was a nonsignificant, negative relationship between treatment status and post-treatment CAARS total symptoms, b = -3.83, $t(15)$ =-1.06, p = .31. At moderate levels of anxiety, the relationship between treatment status and post-treatment CAARS total symptoms was negative and nonsignificant, b = -2.91, $t(15)$ = -.68, p = .51. At severe levels of anxiety, the relationship between treatment status and post-treatment CAARS total ADHD symptoms was negative and nonsignificant, b = -1.76, $t(15)$ = -.23, p = .82. There were no regions of the anxiety raw score in which the regression of post-treatment CAARS total ADHD symptoms on treatment status was significant. Figure 10 illustrates the conditional effects. There was a slight increase in post-treatment CAARS total ADHD symptoms as anxiety level increased among participants in the treatment condition, whereas CAARS total ADHD symptoms was similar across anxiety levels among participants in the control condition.

Figure 10

Conditional Effects of Treatment Status on CAARS Total Score (n = 20)



CHAPTER IV: DISCUSSION

Students with ADHD experience significant impairments during post-secondary education including poor academic achievement (e.g., Gormley et al., 2016) and an increased risk for comorbid anxiety (e.g., Anastopoulos et al., 2018). Research regarding treatment for college students with ADHD is in preliminary stages, and treatment approaches include medication, academic accommodations, and psychosocial interventions. The current study was designed to evaluate the acceptability and efficacy of an ADHD coaching intervention and examine the extent to which anxiety moderated students' response to ADHD coaching in order to help determine for whom coaching works best and why.

Summary of Results

Acceptability and satisfaction. Overall, results from ratings on acceptability and satisfaction questionnaires indicate that participants viewed ADHD coaching favorably. Students in the treatment condition rated the coaching intervention as significantly more acceptable and had significantly higher satisfaction ratings relative to students in the control condition who rated the acceptability of, and their satisfaction with, the newsletters. Although acceptability and satisfaction ratings were high, there was not a statistically significant difference between treatment and control conditions in perceived benefits of coaching. The average item rating on the ABCS was 4.3 on a 6-point Likert type scale (1 = never; 6 = always), suggesting that in general participants perceived some benefit in areas including organization, time management, and planning across treatment and control conditions.

The average number of coaching sessions attended was 5.2 (*SD* = 1.8) out of the intended 6 sessions. Additionally, 60% of participants attended all 6 sessions and only 13% of participants attended 0 to 3 sessions. These attendance rates suggest that a brief, biweekly

treatment approach is suitable for college students. Of note, students were reimbursed for participating in this study, and although reimbursement was not tied to attendance, reimbursement may have influenced attendance rates. The amount of reimbursement received was higher for participants in pilot phase of the study relative to participants in the larger-scale phase, but there was not a statistically significant difference in attendance between the pilot phase (M = 5.8) and larger-scale phase (M = 4.9), which provides some evidence that reimbursement did not unduly influence session attendance.

Another aspect related to the feasibility of ADHD coaching is the extent to which the intervention is delivered with fidelity. Graduate student clinician self-report of adherence to the treatment manual delivered to participants in cohorts 2 and 3 was high (M = 98%) and observations of coaching sessions also indicated high adherence (M = 97%). These ratings suggest that students in the treatment condition received the intervention as intended, and it is reasonable to train graduate student clinicians to deliver ADHD coaching.

Taken together, the acceptability and satisfaction data indicate that college students with ADHD find coaching to be a useful treatment, and it is feasible for college students to attend, and graduate student clinicians to deliver, coaching interventions in a college setting. Previous qualitative studies have shown that college students tend to view coaching positively (e.g., Parker et al., 2013), and the results from this study provide further support for the acceptability of coaching for college students with ADHD.

Treatment efficacy. Although participants viewed coaching favorably, the results from this study are inconclusive regarding intervention efficacy. The strongest predictor of each psychoeducational outcome was students' pre-treatment level of functioning in each area, and treatment status was not associated with a statistically significant effect on any of the

psychoeducational outcomes measured, including GPA, metacognition, global executive functioning, time management, organization, note-taking, study skills, and total ADHD symptoms. Encouragingly, partial effects trended in the expected direction for most outcomes, but the majority of effect sizes were negligible in size (sr^2 = .0001 to .034).

The coaching intervention had a small effect on improving post-treatment GPA. The literature on ADHD coaching has not included statistical analyses of pre-post changes in GPA, and the finding that ADHD coaching was associated with a small magnitude improvement in GPA provides some support for the efficacy of coaching because improved GPA is likely a clinically meaningful outcome for college students with ADHD. The effect of treatment status on time management was negligible but approaching a small effect size (sr^2 = .009), which is also a promising finding as improving time management was the primary focus of the intervention delivered in this study. Coaching had negligible effects on post-treatment note-taking and organization. Only 10% of the participants received sessions targeting note-taking and 5% received sessions targeting organization, and thus, it is not necessarily surprising that the coaching intervention did not have a larger impact on these skills. To further examine the efficacy of the coaching intervention developed for this study, it would be important to examine whether delivering more content related to note-taking and organization results in larger changes in these areas.

An unexpected finding was that the coaching intervention was associated with a slight decrease in study skills. The decrease in study skills was negligible in size, however, and is likely due to sampling error. Fifteen percent of participants received sessions related to study skills, and future research in which more content related to study skills is delivered would help elucidate the efficacy of the study skills content developed for this study. The study skills

content delivered in this study was broad. Coaches were provided with three suggestions for study skills: use of mnemonics, graphic organizers/visual aids, and student generated flash cards. These suggestions were intended to assist coaches in brainstorming potential study strategies with students, but the coaching intervention did not include explicit instruction or guided practice on the use of study skills. It is possible that a direct instructional approach (e.g., Allsopp et al., 2005) is needed to improve study skills. Including other performance-based outcome measures in statistical analyses, such as grades on tests and quizzes, in addition to self-report of study skills, may also provide a better understanding of changes in study skills overtime.

The coaching intervention had a small effect on decreasing post-treatment ADHD symptoms among participants in the pilot phase of the study. Because the coaching intervention was designed to target specific academic skills (e.g., time management), it is somewhat surprising that the coaching intervention had a small effect on ADHD symptoms but did not have the same impact on academic enabling skills. Perhaps self-reported changes in ADHD symptoms in the pilot phase are a function of demand effects; students were aware they were participating in a study related to ADHD, and it is possible that students in the treatment condition reported decreases in ADHD symptoms in order to attempt to conform to their expectations about the purpose of the study. Medication use may also have influenced participants' responses to questionnaires about their ADHD symptoms. Most participants (95%) in the pilot phase of the study were taking medication for ADHD. Participants were explicitly asked to respond to symptom questionnaires based on their behavior when they were not taking their ADHD medication. It is possible, however, that participants' overall perceptions of their symptoms were influenced by their use of ADHD medication. For instance, some participants indicated that they almost always take medication, and as such it was difficult for them to

estimate their functioning without medication. No data were gathered on participant adherence to medication, and as such it is not possible to determine whether medication use affected participant perceptions of ADHD symptoms.

The coaching intervention did not have a statistically significant impact on ADHD symptoms in the large-scale phase of the study. Of note, being in the treatment condition in the large-scale phase of the study was associated with an increase in ADHD symptoms, with the effect size approaching small magnitude (sr^2 = .009). Students in the treatment condition in the large-scale study reported slightly lower levels of ADHD symptoms at pre-treatment relative to students in the control condition, but the raw scores of ADHD symptoms for both groups at pre-treatment fell within the clinically significant range according to normative data for the BAARS-IV. Thus, the increase in ADHD symptoms reported by participants in the treatment condition at post-treatment did not change the normative clinical significance of the symptoms.

The coaching intervention had negligible effects on improving metacognition and global executive functioning. Metacognition and executive functioning are higher-level cognitive skills, representing individuals' ability to monitor their own thinking as well as plan, organize, and problem-solve. The coaching intervention delivered in this study was fewer sessions on average relative to most other coaching research. Several researchers have followed an 8-session coaching model (e.g., Prevatt & Yelland, 2015; Swartz et al., 2005) and others have delivered up to 24 sessions (e.g., Field et al., 2011). It is possible that more sessions of coaching are needed to achieve statistically significant improvements in psychoeducational outcomes, perhaps especially for higher-level cognitive skills, such as executive functioning, that students with ADHD historically struggle with (Weyandt et al., 2017).

Overall, these results provide limited support for the efficacy of the ADHD coaching intervention implemented in this study. It is encouraging that students experienced small magnitude improvements in GPA and that changes in time management skills approached a small effect size, but the intervention did not lead to significant improvement in psychoeducational outcomes over and above pre-treatment functioning as has been found by other researchers (Field et al., 2013; Prevatt & Yelland, 2015; Zwart & Kallemeyn, 2001). Students in the intervention condition had grade-appropriate levels of time management at pre-treatment according to the normative data for the SMASLI, and students in both intervention and control conditions had grade-appropriate levels of organization, note-taking, and study skills at pre-treatment. As such, the students in this sample may have been higher functioning relative to students in other research studies, and thus, had less room for improvement. The majority of the participants were at least juniors in college (64%), which likely influenced the high level of pre-treatment functioning among this sample. Perhaps the intervention delivered in this study would yield larger benefits for students with lower pre-treatment functioning. It is also important to note, the outcome measures used in this study had high test-retest reliability (range r = .75 to .93), which substantially affected their sensitivity to detect pre-post changes in outcomes, and may have contributed to the equivocal findings regarding intervention efficacy.

Moderating effects of anxiety. Participants in this sample reported a mild level of anxiety on average. Although most of the sample reported minimal anxiety (51%), a sizeable portion of the sample endorsed at least mild levels of anxiety (32%), which is consistent with other research that has found elevated anxiety levels among college students with ADHD (e.g., Anastopoulos et al., 2018). Regarding how anxiety affected psychoeducational outcomes, the interaction between anxiety and treatment status did not reach statistical significance in any

moderation analyses, and thus, no conclusions can be made regarding the moderating effect of anxiety on psychoeducational outcomes. With that said, a few notable patterns were identified that may be worthwhile to examine in future studies with sample sizes that have sufficient power to detect significant interactions.

First, in the moderation analysis for GPA, a trend was noted wherein as anxiety increased among students in the treatment condition, post-treatment GPA increased, but as anxiety increased among students in the control condition, GPA decreased. This finding tentatively suggests that students with higher levels of anxiety may respond best to ADHD coaching in terms of their overall academic performance and that students with higher anxiety may also have the poorest academic outcomes without intervention. Second, in moderation analyses involving self-report of functioning, higher anxiety was associated with slightly worse executive functioning problems, academic skill deficits, and ADHD symptoms. Specifically, in moderation analyses examining post-treatment metacognition, global executive functioning, and time management, there was a trend in which participants with severe anxiety had slightly worse post-treatment outcomes, regardless of treatment status. There was a slight decrease in post-treatment organization as anxiety level increased among participants in the control condition as well as a slight increase in post-treatment ADHD symptoms as anxiety level increased among participants in the treatment condition, which also preliminarily suggests that high anxiety may function as a risk factor. Of note, these findings may have occurred by chance and must be interpreted with caution because the interaction between treatment status and anxiety were not statistically significant.

Overall, the hypothesis that students with lower anxiety would experience the most benefit from ADHD coaching was not supported by this study. Rather, examination of trends in

the moderation analysis provide two potential hypotheses for future research: (1) higher anxiety may confer some treatment benefit for GPA, an objective academic outcome, and (2) higher anxiety may also function as a potential risk factor for self-reported outcomes, including problems of executive functioning, learning and study strategy deficits, and ADHD symptoms. Researchers have found that anxiety complicates metacognitive processes, for example by impairing encoding and memory (Roth et al., 2004), which may account for the trend in which higher anxiety was associated with slightly worse self-reported executive functioning, learning, and study strategies. At the same time, however, perhaps moderate levels of anxiety in combination with ADHD coaching could sensitize students to external cues, such as test grades, causing them to work harder to succeed, leading to better objective academic performance. Another possibility is that students with anxiety may be self-conscious of their functioning. For example, anxious youth are less likely to overestimate their skills relative to youth with low anxiety (Bourchtein et al., 2018). Thus, even though students with anxiety may achieve slightly higher objective academic performance during the intervention, they may be especially self-critical when rating their functioning.

Limitations of the Present Study

Cohort differences. There were several notable differences between the pilot and large-scale phases of the study. First, the pilot phase did not involve the use of a manualized intervention, and the principal investigator delivered all coaching sessions. In the large-scale phase, a manualized intervention was used and graduate student clinicians delivered the coaching intervention. Although intervention content was similar between study phases, the intervention was iteratively modified across phases, with formative analyses of the pilot phase informing the creation of the treatment manual delivered to participants in the large-scale phase. Therefore, the

internal validity of the study is limited because participants in the different study phases received appreciably different interventions. Second, the use of the principal investigator as the coach in the pilot phase may have biased the results through *demand effects* (i.e., participants responding in a way to please the experimenter) and/or *experimenter effects* (i.e., experimenter behavior influencing participant responses). Third, newsletters were available to all participants in the large-scale phase of the study but were only available to participants in the control condition during the pilot phase. Although the impact of the newsletter is likely to have been small, there was not an attempt to measure this effect in isolation.

Given the differences between cohorts, cohort status (pilot vs. large-scale phase) was included as a covariate in all statistical analyses. Cohort status did not have statistically significant partial effects on any psychoeducational outcomes, which suggests that the intervention effect on these outcomes was similar across phases. But cohort status did have a small effect on metacognition; specifically, being a member of the large-scale study was associated with an approximately 4-point raw score decrease on post-treatment metacognitive impairment. In short, it is possible that the intervention package improved across study phases in relation to metacognition, but not to a meaningful degree.

Treatment adherence. As mentioned previously, six graduate student clinicians delivered the coaching intervention in the large-scale phase of the study. Self-reported adherence to the intervention and adherence ratings made by the principal investigator during session observations were high on average (98% and 97%, respectively). A notable limitation of these adherence metrics is that coaches and the principal investigator may have been motivated to view themselves positively (social desirability bias), leading to an overestimation of

adherence. In future research, the use of audio recordings rated by independent evaluators who are blind to the study hypotheses could provide a stronger measure of treatment adherence.

Attrition. There was a low rate of attrition in this study, with one student dropping out of the study after intake (2% of sample), four participants (7% of sample) missing at least one self-report post-treatment measure, and two of these four participants missing all self-report post-treatment measures. The four participants with missing post-treatment data were members of the control condition. The attrition in the control condition may have introduced selection bias into the study; there may be systematic differences in participant characteristics between students who dropped out of the study relative to students in the control condition who remained in the study, and the differential attrition may also have led to systematic differences between students in the treatment versus control conditions. Multiple imputation was used to account for missing data and limit the impact of selection bias.

Anxiety levels. There was limited variability in self-reported anxiety levels on the BAI. With only a few individuals at higher end of the scale (12% moderate anxiety, 5% severe anxiety), the reliability of the moderating effects of moderate and severe comorbid anxiety on psychoeducational outcomes is questionable, and the effect sizes in the models tested were reduced. In order to better examine the relationship between the coaching intervention and psychoeducational outcomes, it will be important for future researchers to recruit samples with adequate variability in anxiety. In this study, participants were recruited solely from DSS. Not only does recruiting from DSS limit the generalizability of the results to the overall population of college students with ADHD, the pool of potential participants was smaller, which may have contributed to the difficulty obtaining a sample with more variability in anxiety. Furthermore, there was a high rate of medication use among participants in this study (85%), suggesting that

this sample of students acknowledged and accepted their ADHD diagnosis and responded well to stimulant medications that may not be well tolerated by individuals with high anxiety. These characteristics of the sample may not be representative of the overall population of college students with ADHD, which also potentially limits the generalizability of the results. Broadening recruitment to include students who are not registered with DSS could potentially improve variability in anxiety but would also likely require more thorough initial assessment to establish an ADHD diagnosis. It may also be helpful to target recruitment to incoming freshmen as these students experience significant impairment (Gormley et al., 2016; Rabiner, Anastopoulos, Costello, Hoyle, & Swartzwelder, 2008) and as such are in high need of treatment.

As discussed previously, there is not a strong understanding of the prevalence of anxiety among college students with ADHD, and studies to date have not reported variance in BAI classifications among college students with ADHD. The variability in anxiety obtained among the participants in this study is comparable to another study in which 5% of college students with ADHD met criteria for an anxiety disorder (Heiligenstein & Keeling, 1995). As such, it may be difficult to recruit samples with sufficient variability in anxiety to conduct moderation analyses. If high anxiety is indeed a significant risk factor, perhaps students with ADHD and high comorbid anxiety are less likely to attend or remain in post-secondary education, which may contribute to low incidence of high comorbid anxiety among college student populations and make recruitment of college students with ADHD and anxiety challenging. Additionally, the moderating effect of anxiety may be better investigated through curvilinear analyses as previous researchers have found a curvilinear relationship between anxiety and performance. Greater variability in anxiety and larger sample sizes to achieve sufficient power would be crucial for

conducting curvilinear analyses and are two factors which precluded the use of curvilinear analyses in this study.

Sample size. Power analyses conducted after the pilot phase of the study suggested that a sample size of 50 would allow for 80% power in the moderation analyses examining the conditional effects of anxiety on time management, metacognition, and GPA. A sensitivity analysis conducted with the statistical software G*Power indicated that with statistical power of .80 and the obtained total sample size of 59, a two-tailed *t*-test of a single regression coefficient in both three and five predictor models would only detect effect sizes (f^2) larger than .138 (Faul et al., 2009). Given the effect sizes of interaction terms obtained in the moderation analyses in the current study, sample sizes of 199 at minimum would be needed for an adequately powered clinical trial, assuming two-tail tests, five predictors, and $\alpha = .05$.

Implications for Future Research

The results of this study and previous research indicate that coaching is an acceptable treatment for college students with ADHD. Given that results regarding intervention efficacy generally trended in the anticipated direction in this study, and other researchers have found statistically significant improvements in learning and study strategies (Field et al., 2013; Prevatt & Yelland, 2015; Zwart & Kallemeyn, 2001), it would be beneficial to conduct more randomized controlled trials of ADHD coaching for college students. The current literature relies largely on self-report of symptoms and functioning to evaluate the efficacy of ADHD coaching, but students with ADHD tend to overestimate their abilities (Prevatt et al., 2012) and students with comorbid internalizing conditions may be more critical of their abilities (Bourchtein et al., 2018). Thus, incorporating other outcome measures, such as informant reports to cross-validate participants' self-reports or objective measures of academic enabling

skills (e.g., tracking the number of late/missed assignments, physically evaluating participants' planners using objective standards) will allow for better examination of coaching efficacy and the moderating effect of anxiety. Objective measures in particular may be more sensitive to change relative to standardized rating scales, which would greatly improve the likelihood of detecting pre-post changes in functioning. Longitudinal studies are needed in order to determine whether improvements in academic enabling skills and other clinically meaningful outcomes, such as graduation rates, are sustained overtime. Such studies may be particularly helpful in examining whether coaching results in improvements in GPA as differences between groups in GPA may emerge overtime. Longitudinal studies would also allow for examination of dose-response relationships, which would aide practitioners in delivering optimal doses of treatment. Additionally, it would be interesting to examine processes involved in treatment response. Theoretically, students internalize the Socratic-process coaches use in intervention delivery to self-regulate strategy use (e.g., Prevatt & Levrini, 2015). Mediational analyses could be used to explore whether changes in self-regulation and metacognition lead to changes in psychoeducational outcomes.

To further examine the efficacy of the treatment manual developed for this study, it would be important to conduct a study in which the same manualized intervention was delivered to all participants in the treatment condition, as this would improve the internal validity of the study. The intervention may also need to be expanded to include more sessions. As noted above, other coaching interventions range from 8 to 24 sessions (Prevatt, 2016), and it is possible that more coaching sessions are needed in order for participants to experience greater improvements in outcomes. Results of this study were inconclusive regarding whether anxiety functions as a moderator of treatment response. As discussed previously, obtaining samples with

more variability in anxiety in future studies and examining data using curvilinear analyses would allow for a more reliable examination of whether anxiety significantly affects treatment response. The use of different self-report measures of anxiety may also be beneficial. The BAI was chosen for this study because it is brief, reliable, and has good discriminant validity in distinguishing anxiety from depression. A limitation of the BAI is that individuals are asked to self-report on anxiety over the past week, and the items focus on physiological anxiety symptoms. Thus, this measure may not adequately capture individuals' general tendencies to experience anxiety and worry. A measure such as the State-Trait Anxiety Inventory (Spielberger, 1983), that assesses both transient anxiety and individuals' general anxiety proneness, may allow for a more nuanced examination of moderating effects of anxiety.

Conclusions

This randomized controlled trial evaluated the acceptability and efficacy of a coaching intervention for college students with ADHD and examined the extent to which comorbid anxiety influenced treatment response. Students who received the coaching intervention were satisfied with the intervention and found the procedures acceptable. ADHD coaching was associated with a small effect on improving GPA across all participants and a small effect on decreasing ADHD symptoms among participants in the pilot phase of the study. The intervention did not result in statistically significant improvements in psychoeducational outcomes including executive functioning and learning and study strategies. Results from moderation analyses were inconclusive but trends indicate that anxiety may affect objective and self-reported outcomes differently, with higher levels of anxiety potentially conferring some treatment benefit for academic outcomes (GPA) but also functioning as a risk factor for self-reported outcomes. It will be important for future researchers to recruit samples with more

variability in anxiety levels to reliably examine the impact of comorbid anxiety on psychoeducational outcomes.

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APPENDIX A: IRB Approval

RX: Your study has been approved

umcirb@ecu.edu
Wed 08/23/2017 08:50 AM
To: Kininger, Rachel Lynn <kiningerr13@students.ecu.edu>

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** ·
www.ecu.edu/ORIC/irb

Notification of Initial Approval: Expedited

From:	Social/Behavioral IRB
To:	Rachel Kininger
CC:	Brandon Schultz
Date:	8/23/2017
Re:	UMCIRB 17-001409 ADHD Coaching for College Students

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 8/22/2017 to 8/21/2018. The research study is eligible for review under expedited category #7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
ADHD Benefits of Coaching Scale	Surveys and Questionnaires
Behavior Intervention Rating Scale	Surveys and Questionnaires
Demographics Questionnaire	Surveys and Questionnaires
Dissertation Proposal	Study Protocol or Grant Application
Informed Consent	Consent Forms
McLean Screener BPD	Surveys and Questionnaires
Patient Health Questionnaire	Surveys and Questionnaires
SCID II-PQ	Surveys and Questionnaires
Treatment Satisfaction Survey	Surveys and Questionnaires
Updated_Email_Fall	Recruitment Documents/Scripts

Name	Description
Updated_Email_Spring	Recruitment Documents/Scripts
Updated_Flyer_Fall	Recruitment Documents/Scripts
Updated_Flyer_Spring	Recruitment Documents/Scripts

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

—

Study.PI Name:
Study.Co-Investigators:

APPENDIX B: ADHD Coaching Manual

Students who receive the coaching intervention should receive a total of six sessions. An overview of session content is provided below.

- **Session 1: Goal Setting and Introduction to Time Management**
- **Session 2: Planner Set-Up**
    - *Plus optional session supplement: topic introduction**
- **Session 3: Time Management Follow-Up**
    - *Plus optional session supplement: topic introduction or follow-up**
- **Session 4: Time Management Follow-Up**
    - *Plus optional session supplement: topic introduction or follow-up**
- **Session 5: Time Management Follow-Up**
    - *Plus optional session supplement: follow-up**
- **Session 6: Future Planning**

The optional session supplement topics and follow-ups include:

- *Introduction to Organization* and *Organization Follow-Up*
- *Introduction to Note-Taking* and *Note-Taking Follow-Up*
- *Introduction to Study Skills* and *Study Skills Follow-Up*

*The coach should only implement an optional session supplement if the student expresses an interest in working on one or more additional topic areas. If indicated, the coach needs to implement the appropriate *Introduction* session supplement and then implement the corresponding *Follow-Up* material in subsequent sessions. It is recommended that only one supplemental topic area be covered.

Session 1: Goal Setting[1] and Introduction to Time Management

The purpose of this session is to:

- *Work with the student to develop long-term goals that the student wants to achieve during the semester*
- *Discuss the student's time management strategies*

1) Spend time in the beginning of the session to build rapport with the student.
    a. Introduce yourself and find out basic information about the student. Explain that you will be working together to help the student develop new academic strategies.

2) Explain that the student will receive support with time management strategies as a part of this study. The coach and student should discuss the following:
    a. What system(s) does the student currently use to track assignments and appointments?
    b. How effective are the strategies the student is using now? What has worked well? What problems have the student run into?
    c. What would the student like to do differently?

3) Elicit discussion around the three other key focus areas (organization, note taking, or study skills) and find out if the student wants to work on any of these skills in addition to time management.

4) Develop at least one long-term goal related to time management improvement, and at least one long-term goal related to any other area the student wishes to target. Ask questions to help the student develop specific, realistic, process based, and time sensitive goals (e.g., How will you know that your time management has improved? What will that look like?).

[1] Goal setting material is drawn from Prevatt & Levrini (2015)

5) Help the student set at least one short-term goal to work on before the next session:
    a. What is the first step you can take in getting closer to your long-term goals?
    b. Help the student brainstorm several *specific* ideas and identify the pros/cons of each idea (e.g., How likely is it that you will take this step? What might get in the way?)
    c. **The coach should suggest that the student gets some type of planner** (can be a physical planner or a digital planner) as one short-term goal for the next session. Discuss the pros/cons of different planner set-ups (e.g., planners organized by day versus planners organized by months).

6) Determine the day and time for the next appointment. Explain that the goal is for the student to meet with the coach every other week.
    a. Discuss the strategies the student currently uses for remembering appointments and what reminder system the student plans to use to remember the next coaching session appointment.

Sessions 2: Planner Set-Up

The purpose of this session is to:

- *Help the student develop a specific plan for how he/she will use a planner to track assignments and to assist with time management*

The coach should be mindful of the following guidelines when discussing time management and assignment tracking strategies with the student[1]

- Students should have one planner kept with them at all times
- Students should enter every task and appointment into their planner
- Students should check their planner three times a day, and update their planner on a daily basis
- It is helpful to schedule repeated tasks for the same time each day and to schedule relaxation time
- Plan to do more difficult tasks when motivation is typically highest, plan to do the easiest tasks when motivation is lowest, and don't stop in the middle of a difficult part of a task

1) Help the student brainstorm about how to use their planner.
    a. What information is important for the student to include in the planner? How will the student find that information? Will the student use the planner to record specific time management plans (e.g., study English from 5pm-6pm) or more generic time management plans (e.g., study English today)? How often will the student check the planner?

The coach should listen for whether students are following the Solanto (2011) guidelines when the student is generating ideas for planner use. The coach can offer suggestions to help guide the student toward Solanto's (2011) recommendations, but the coach should *not* tell the student what to do.

[1] Planner guidelines are drawn from Solanto (2011)

2) Once the student has developed a plan for assignment tracking/planner use, discuss the potential barriers the student may encounter when enacting the plan between appointments.
    a. What barriers may get in the way of carrying out the plan?
    b. How motivated is the student to use the new system? Work with the student to develop a plan for using incentives if necessary.

3) Determine the day and time for the next appointment.
    a. Discuss the strategies the student currently uses for remembering appointments and what reminder system the student plans to use to remember coaching session appointments

Sessions 3-5: Time Management Follow-Up

The purpose of Time Management Follow-Up is to:

- *Help the student track progress on time management/assignment tracking strategies*

1) Once the student has developed a plan for planner use, the coach should start each session by evaluating the student's progress on planner use.[1]
    a. Physically look through the student's planner and talk through their planner use. How often did he/she check the planner? Did he/she have the planner every day? How easy was it to use the planner? What information is the student keeping in the planner?
    b. Point out patterns you notice. Is there more writing on some days compared to others? Which days did the student complete all the tasks written in the planner? What helped the student do this? Which days were hardest for the student to complete the tasks in the planner? What got in the way?

2) Identify issue/goal: Will the student continue with the time management strategies used since the last appointment? Will the student work to develop a different strategy?
    c. If the student will be using the same strategies skip to #7

3) Brainstorm solutions: If the student is developing new strategies for time management, coaches should listen for whether the student is following the Solanto (2011) guidelines when students brainstorm strategies. Coaches can offer suggestions to guide the student toward the recommended strategies but should *not* tell the student what to do.

4) Identify pros/cons of each strategy identified: coaches should help the student identify pros/cons of strategies generated and especially help the student think through potential cons when students clearly deviate away from the Solanto (2011) recommendations.

[1] Adapted from Schultz & Evans (2015)

5) Select a specific solution and identify barriers:
    d. What new/continued strategies is the student going to try?
    e. What barriers may get in the way of carrying out the plan?
    f. How motivated is the student to enact the plan? Work with the student to develop a plan for using incentives if necessary.

6) Determine the day and time of the next appointment.
    g. Review the strategies the student has been using to remember the appointments. If there have been no attendance issues, reinforce the student for using an effective strategy.
    h. If attendance has been an issue, engage in problem solving around their current strategy for remembering appointments. What are they doing now? What has gotten in the way of this working? Generate alternative solutions (e.g., reminder in phone, reminder email) and evaluate pros/cons. Pick a solution and identify the potential barriers.

Optional Session Supplement: Introduction to Organization

This is an optional supplement that the coach can add to sessions 2, 3, or 4 if the student wants to target organization in addition to time management. The **Time Management** material should be discussed first, and then the coach can deliver *Introduction to Organization*.

> *The purpose of this session is to:*
>
> - *Help students develop a concrete organization system through the creation of a checklist*

1) Discuss the system(s) the student currently uses for organization. Students may wish to target different aspects of their organization such as organizing their class materials or keeping their workspace at home organized.
    a. What strategies does the student currently use? What works well? What does not work?

2) Work with the student to develop a specific organization plan that can be monitored with a checklist consisting of yes/no questions.[1] Students may prefer different organization strategies such as keeping digital notes versus keeping hard copies of notes. Allow students to use the organization method he/she prefers. The goal is to work with students to help them develop an organization system and to monitor their use of the system.
    a. Engage in brainstorming with the student to come up with different organization strategies. Evaluate the pros/cons of the solutions generated.
    b. Have the student pick a solution(s) and work with the student to create a checklist for monitoring the organization plan. Items should be positively phrased and specific (e.g., keep my homework materials in the red folder; class notes are written in the correct section of my notebook). The student should record the percentage of items completed each time he/she uses the checklist.

[1] Organization intervention adapted from Schultz & Evans (2015)

3) Come up with a plan for how the student will stick to the organization system created and how to monitor progress with the checklist (shared excel files may be helpful).
    a. What barriers may get in the way of carrying out the plan?
    b. How motivated is the student to use the new system? Work with the student to develop a plan for using incentives if necessary.

Optional Session Supplement: Organization Follow-Up

The *Organization Follow-Up* should only be delivered if *Introduction to Organization* has already been implemented. The **Time Management Follow-Up** material should be delivered first, and then the coach can implement *Organization Follow-Up*.

> *The purpose of Organization Follow-Up is to:*
>
> - *Help students monitor their progress on organization goals.*

1) Evaluate the student's progress on the organization goal that was set at the last appointment.[1]
    a. Go through the checklist to rate the student's organization. How often did he/she use the checklist between sessions? How did the organization system work? How easy was it to keep up with it? What got in the way?

2) Identify issue/goal: will the student continue with the system developed last week? Does the student think any tweaks to the checklist need to be made?

3) Engage in brainstorming of new strategies if necessary and engage in discussion around pros/cons of strategies identified.

4) Develop the short-term goal to work on for the next session. The goal may simply be to continue use of the organization system and maintain a certain percentage on the checklist. Determine:
    a. What barriers may get in the way of carrying out the plan?
    b. How motivated is the student to work toward the goal? Work with the student to develop a plan for using incentives if necessary.

[1] Adapted from Schultz & Evans (2015)

Optional Session Supplement: Introduction to Note-Taking

This is an optional supplement that the coach can add to sessions 2, 3, or 4 if the student wants to target note-taking in addition to time management. The **Time Management** material should be discussed first, and then the coach can deliver *Introduction to Note-Taking*.

The purpose of this session is to:

- *Evaluate the student's current note taking strategies*
- *Develop a plan for new note taking strategies*

1) Discuss the system(s) the student currently uses for note-taking.[1]
    a. What strategies does the student currently use? Does the student take notes by hand or on a computer? Is the student trying to write down every word? Is the student taking notes at all? Is there one particular class where note taking is difficult? What works well? What does not work?
    b. If the student is willing, ask the student to show you some recent notes he/she took and ask the student to verbally interpret the notes. Discuss areas where the student was able to interpret notes and areas where the student struggled.

2) Help the student brainstorm different strategies for note-taking and identify the pros/cons of the different strategies generated.
    a. Separating main ideas and details when taking notes (e.g., main ideas on the left, details on the right) or creating graphic organizers may be helpful note-taking strategies for students

3) Pick a strategy and develop a short-term goal for the next session.
    a. What barriers may get in the way of carrying out the plan?
    b. How motivated is the student to work toward the goal? Work with the student to develop a plan for using incentives if necessary.

[1] Note-taking intervention adapted from Schultz & Evans (2015)

Optional Session Supplement: Note-Taking Follow-Up

The *Note-Taking Follow-Up* should only be delivered if *Introduction to Note-Taking* has already been implemented. The **Time Management Follow-Up** material should be delivered first, and then the coach can implement the *Note-Taking Follow-Up*.

The purpose of Note-Taking Follow-Up is to:

- *Help students monitor their progress on note-taking goals*

1) Evaluate the student's progress on the note-taking goal that was set last week.[1]
    a. If possible, look through some PowerPoint material that was presented in class and help the student evaluate how well he/she took down the main ideas and details presented in the lecture. Alternatively notes could be evaluated by asking the student to interpret his/her notes.
    b. What worked well? What did not work? What barriers got in the way?

2) Identify issue/goal: will the student continue with the same note-taking strategies? Does the student need to develop new strategies?

3) Engage in brainstorming of new strategies if necessary and engage in discussion around pros/cons of strategies identified.

4) Develop the short-term goal to work on for the next session. The goal may simply be to continue use of the note-taking strategies.
    a. What barriers may get in the way of carrying out the plan?
    b. How motivated is the student to work toward the goal? Work with the student to develop a plan for using incentives if necessary.

[1] Adapted from Schultz & Evans (2015)

Optional Session Supplement: Introduction to Study Skills

This is an optional supplement that the coach can add to sessions 2, 3, or 4 if the student wants to target study skills in addition to time management. The **Time Management** material should be discussed first, and then the coach can deliver *Introduction to Study Skills*.

> *The purpose of this session is to:*
>
> - *Evaluate the student's current study strategies*
> - *Develop a plan for new study strategies*

1) Discuss the system(s) the student currently uses for studying.
    a. What strategies does the student currently use? What works well? What does not work?

2) Help the student brainstorm different strategies for studying and identify the pros/cons of each strategy. Some study strategies that may be helpful are presented below.[1] Coaches can offer suggestions around these skills, but the coach should *not* tell the student what to do.
    a. Using mnemonic strategies to aid with memorization (e.g., acrostic, loci method)
    b. Creating graphic organizers/other visual aides
    c. Making flashcards with short, student-generated definitions

Generally, rote memorization is not helpful for students with ADHD so coaches should try to help students develop more active strategies

3) Pick a strategy and develop a short-term goal for the next session.
    a. What barriers may get in the way of carrying out the plan?
    b. How motivated is the student to work toward the goal? Work with the student to develop a plan for using incentives if necessary.
    c. It will likely be useful to schedule study time in the student's planner.

[1] Study strategies recommended by Schultz & Evans (2015) and Prevatt & Levrini (2015)

Optional Session Supplement: Study Skills Follow-Up

The *Study Skills Follow-Up* should only be delivered if *Introduction to Study Skills* has already been implemented. The **Time Management Follow-Up** material should be delivered first, and then the coach can implement *Study Skills Follow-Up*.

The purpose of Study Skills Follow-Up is to:

- *Help students monitor their progress on study skills goals*

1) Evaluate the student's progress on the study skills goal that was set last week.
    a. What worked well? What did not work?

2) Identify issue/goal: will the student continue with the same study strategies? Does the student need to develop new strategies?

3) Engage in brainstorming of new strategies if necessary and engage in discussion around pros/cons of strategies identified.
    a. Strategies may be related to study skills or it may be necessary to work with the student to brainstorm strategies for using incentives to help him/her follow through with the established plans.

4) Develop the short-term goal to work on for the next session. The goal may simply be to continue use of the study strategies.
    a. What barriers may get in the way of carrying out the plan?
    b. How motivated is the student to work toward the goal? Work with the student to develop a plan for using incentives if necessary.

Session 6: Future Planning

The purpose of this session is to:

- *Help student evaluate their progress over the course of the semester*
- *Review which strategies were most helpful, which strategies the student plans to continue using, and the student's plan for maintaining progress*

1) Evaluate the student's progress on the time management/assignment tracking goals that were set at the last appointment. If applicable, evaluate the student's progress on an additional topic area goal.

2) Discuss overall progress this semester
    a. What strategies have worked the best?
    b. What strategies did not work?
    c. What areas does the student feel improved the most?
    d. Relate overall progress back to the long-term goals that were set at the first appointment. How does the student feel he/she did in meeting these goals?

3) Discuss the plans the student has for moving forward
    a. What strategies do you plan to use next semester?
    b. How motivated are you to continue use?
    c. What barriers may get in the way? How do you plan to overcome these barriers?

APPENDIX C: Adherence Checklists

Session 1 Adherence Checklist

Circle Yes/No to indicate whether the following components were implemented and fill in specific information where indicated.

1) Did you build rapport with the client? Yes No

Notes:

2) Did you discuss current time management strategies used and their effectiveness? Yes No

Briefly report current strategies/effectiveness:

3) Did you determine other focus areas? Yes No

Note any other focus areas:

4) Did you help the client develop a long-term goal(s)? Yes No

Report goal(s):

-
-

5) **Did you set at least one short-term goal for next session?** Yes No
Did you discuss getting a planner/planner systems? Yes No

Report short-term goal(s):

-
-

6) **Did you determine the day/time for next appointment?** Yes No

Report set date/time and briefly describe strategies used to remember appointments.

Please report any other additional information and/or reasons why session plan was altered.

Session 2: Planner Set-Up Adherence Checklist

1) **Did you help the student brainstorm how to use their planner?** Yes No

Notes (info client will include in planner, how will use planner etc.):

2) **Did you discuss potential barriers for planner use?** Yes No

Briefly report barriers and incentive system (if applicable):

3) **Did you determine the day/time for next appointment?** Yes No

Report set date/time and briefly describe strategies used to remember appointments.

Please report any other additional information and/or reasons why session plan was altered.

Session 3: Time Management Monitoring Adherence Checklist

1) Did you evaluate the client's progress on time management/assignment tracking? Yes No

Notes:

2) Did you determine whether the student will continue with the same strategies? Yes No

Notes:

3) Did you help the client brainstorm new strategies? Yes No N/A

Notes:

4) Did you help the client identify pros/cons of new strategies? Yes No N/A

Notes:

5) Did you help the student select a specific solution and identify barriers? Yes No

Notes:

6) Did you determine the day/time for next appointment? Yes No

Report set date/time. Describe attendance issues addressed if applicable:

Please report any other additional information and/or reasons why session plan was altered.

Session 4: Time Management Monitoring Adherence Checklist

1) Did you evaluate the client's progress on time management/assignment tracking? Yes No

Notes:

2) Did you determine whether the student will continue with the same strategies? Yes No

Notes:

3) Did you help the client brainstorm new strategies? Yes No N/A

Notes:

4) Did you help the client identify pros/cons of new strategies? Yes No N/A

Notes:

5) Did you help the student select a specific solution and identify barriers? Yes No

Notes:

6) Did you determine the day/time for next appointment? Yes No

Report set date/time. Describe attendance issues addressed if applicable:

Please report any other additional information and/or reasons why session plan was altered.

Session 5: Time Management Monitoring Adherence Checklist

1) Did you evaluate the client's progress on time management/assignment tracking? Yes No

Notes:

2) Did you determine whether the student will continue with the same strategies? Yes No

Notes:

3) Did you help the client brainstorm new strategies? Yes No N/A

Notes:

4) Did you help the client identify pros/cons of new strategies? Yes No N/A

Notes:

5) Did you help the student select a specific solution and identify barriers? Yes No

Notes:

6) Did you determine the day/time for next appointment? Yes No

Report set date/time. Describe attendance issues addressed if applicable:

Please report any other additional information and/or reasons why session plan was altered.

Session 6: Future Planning Adherence Checklist

1) **Did you evaluate the client's progress on time management/assignment tracking?** Yes No

Notes:

2) **Did you discuss overall progress this semester?** Yes No

Notes:

3) **Did you discuss the plans the client has for moving forward?** Yes No N/A

Notes:

Please report any other additional information and/or reasons why session plan was altered.

Introduction to Organization: Adherence Checklist

Added to session number _____

1) **Did you discuss the client's current organization strategies?** Yes No

Notes:

2) **Did you develop a specific organization plan with the student?** Yes No

Briefly describe what was brainstormed, pros/cons etc.:

3) **Did you come up with a plan for how the client will stick to the organization system?** Yes No N/A

Please report barriers and any incentives:

Please report any other additional information and/or reasons why session plan was altered.

Organization Follow-Up: Adherence Checklist

Added to session number _____

1) **Did you evaluate the client's progress on the organization goal?** Yes No

Notes:

2) **Did you determine whether the client will continue with the same system?** Yes No

Notes:

3) **Did you help the client brainstorm new strategies/evaluate pros/cons (if necessary)?** Yes No N/A

Notes:

4) **Did you develop a short-term organization goal for next session?** Yes No

Report goals, barriers discussed, and motivation

Please report any other additional information and/or reasons why session plan was altered.

Introduction to Note-Taking: Adherence Checklist

Added to session number _____

1) **Did you discuss the client's current note-taking strategies?** Yes No

Notes, include brief report of client interpreting their notes if conducted:

2) **Did you help the student brainstorm different note-taking strategies/evaluate the pros/cons of strategies?** Yes No

Notes:

3) **Did you develop a short-term note-taking goal for next session?** Yes No

Report strategy client picked, goal generated, barriers, and any incentives:

Please report any other additional information and/or reasons why session plan was altered.

Note-Taking Follow-Up: Adherence Checklist

Added to session number _____

1) **Did you evaluate the client's progress on the note-taking goal?** Yes No

Notes:

2) **Did you determine whether the client will continue with the same note-taking strategies?** Yes No

Notes:

3) **Did you help the client brainstorm new strategies/evaluate pros/cons (if necessary)?** Yes No N/A

Notes:

4) **Did you develop a short-term note-taking goal for next session?** Yes No

Report goals, barriers discussed, and motivation

Please report any other additional information and/or reasons why session plan was altered.

Introduction to Study Skills: Adherence Checklist

Added to session number _____

1) **Did you discuss the client's current study strategies?** Yes No

Notes:

2) **Did you help the student brainstorm different study strategies/evaluate the pros/cons of strategies?** Yes No

Notes:

3) **Did you develop a short-term study goal for next session?** Yes No

Report strategy client picked, goal generated, barriers, and any incentives:

Please report any other additional information and/or reasons why session plan was altered.

Study Skills Follow-Up: Adherence Checklist

Added to session number _____

1) **Did you evaluate the client's progress on the study skills goal?** Yes No

Notes:

2) **Did you determine whether the client will continue with the same study strategies?** Yes No

Notes:

3) **Did you help the client brainstorm new strategies/evaluate pros/cons (if necessary)?** Yes No N/A

Notes:

4) **Did you develop a short-term study skills goal for next session?** Yes No

Report goals, barriers discussed, and motivation

Please report any other additional information and/or reasons why session plan was altered.